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B L I S T E R R U S T W O R K

I N T H E F A R W E S T

January 1 to December 31, 1926

Spokane Branch
Office of Blister Rust Control,
618 Realty Building
Spokane, Washington

W157-W176.
50 year old white pine stand, on St. Joe River, Idaho. Typical of Dense Pole eradication type. This stand is practically Ribes free.

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BLISTER RUST WORK
IN THE FAR WEST
January 1 to December 31, 1926.

* * * *

INTRODUCTION

The following report on the activities of the Western Branch of the Office of Blister Rust Control, Bureau of Plant Industry, for the period January 1, 1926 to December 31, 1926, covers the work of this Office for the fifth calendar year since the discovery of white pine blister rust in the West. While the introduction to the previous annual reports of this Office has given very briefly the status, at the end of each year, of the rust itself, it may be of value at this time to briefly summarize the work which this Office has done as well as the spread of the rust. The current progress of the spread of the rust and also of the development of our work is given below in tabular form:

Yearly Progress

Year	The Rust	The Work
1922	Found in Puget Sound region of Washington, and interior of British Columbia.	Largely confined to scouting for the disease, cultivated black currant eradication in western Washington, and quarantine inspection. A very small experimental Ribes eradication carried on at Elk River, Idaho.
1923	General spread of the rust over the dry belt of B. C. and into north central Washington First Ribes infections found at Nelson, B. C.	Extension of cultivated black currant eradication program to Montana, Idaho, Oregon, and California. Small experimental Ribes eradication project on Priest River Experiment Station. Beginning of reconnaissance.
1924	Practically no spread of the rust	Satisfactory development of cultivated black currant eradication program. Larger experimental Ribes eradication project in Upper Priest River Valley. Reconnaissance applied over north end of Kaniksu National Forest.
1925	Extension of rust into northwestern Oregon. Ribes infection found over area 20 miles in extent, east and west, in the general vicinity of Nelson, B. C.	Completion of cultivated black currant eradication in Oregon. Satisfactory progress in other states. Reconnaissance extended to the Coeur d'Alene National Forest and to lands of private timber owners of north Idaho. Further experimental Ribes eradication in Upper Priest River Valley and new project on Crater National Forest, Oregon.
1926	Development of pine infection on Olympic Peninsula and in vicinity of Nelson, B. C. No further spread of Ribes infection.	Completion of cultivated black currant eradication in Montana. Special development of reconnaissance methods, resulting in much more rapid work. Experimental Ribes eradication in West Branch region of Kaniksu National Forest results in material lowering of costs, by developing of scouting methods. Experimental Work shows feasibility of chemical eradication. Experimental Ribes eradication started in California. Clearer conception gained of ecology project. Quarantine 63 put into effect.

The most important features of the development of the rust in the West during these periods, has been the establishment of definite focuses of infection, one on the Olympic Peninsula of western Washington and one in the vicinity of Nelson, British Columbia. The most striking phases in the development of our work during the calendar year 1926, have been, (1) the near completion of the cultivated black currant eradication program, (2) the development and use of reconnaissance methods which are at once sufficiently accurate to secure the information needed and are much more rapid than anything hitherto used, permitting a very great extension of this work during the past season. (3) The development of experimental Ribes eradication methods both by hand pulling and by application of chemicals. (4) The development of the ecological studies. The progress made in these last two points does not mean that these problems are solved; it merely means that we have now attained a sufficient understanding of the problems involved so that we can work upon them in a more intelligent fashion.

The work of the Western Branch of the Office of Blister Rust Control, for the period January 1, 1926 to June 30, 1926, was conducted under an allotment of funds of $140,000 for the fiscal year 1926; the work for the period July 1, 1926 to December 31, 1926, under an allotment of $160,000 for the fiscal year 1927. Both of these allotments were for the western blister rust control program only. The appropriations for these two fiscal years were allotted to the several field projects by the Secretary of Agriculture as follows:

Allotment of Funds, Fiscal Year 1926

Project	Period July 1, 1925 to June 30, 1926.
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$30,005.02
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors effecting local control,	27,263.34
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands,	38,585.00

Project (Cont.)	Period July 1, 1925 to June 30, 1926 (Cont.)
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	$ 7,456.67
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
6. For miscellaneous expenses, including supervision, supplies, clerical assistance, reserve, etc.	24,689.97
Total	$140,000.00

Allotment of Funds, Fiscal Year 1927

Project	Period July 1, 1926 to June 30, 1927
A. Study and Application Delay Measures	
1. Continuance toward eventual completion of eradication of cultivated black currants in the states of Montana, Idaho, Washington, Oregon and California. (preliminary control measures)	$15,000
2. Continuance of necessary quarantine inspection to prevent further dissemination of the rust through shipment of infected host plants	9,500
3. Field inspections and surveys in Oregon to determine the spread of the disease from year to year and to apply practical measures of checking it.	10,000
B. Study of Disease to Determine Important Facts influencing its Control.	
1. Pathological Investigation	12,000
C. Experimental Development and Application of Local Control Measures.	
1. Control reconnaissance to determine the potential blister rust danger in various localities and forest stand types and to estimate cost of control,	
(a) In western white pine region	10,000

Project (Cont.)	Period July 1, 1926 to June 30, 1927 (Cont.)
(b) In sugar pine region	$ 5,000
2. Large scale demonstration in the application of local control on the national forests in the western white pine belt	44,500
3. Cooperative demonstration of local control on State and private western white pine land	10,000
4. Small scale demonstrations in the application of local control on the national forests in the sugar pine belt	10,000
5. Development of improved control methods, reduction of eradication costs, and working out methods for assuring efficiency of eradication on control areas, including a study of Ribes regrowth on 1922 and 1923 control areas	
(a) In western white pine areas	10,000
(b) Sugar pine areas	4,000
6. Experiments to determine the toxicity of chemicals and to develop effective means of applying them in Ribes eradication	5,000
7. Study of Ribes ecology to determine factors influencing occurrence and regrowth of these plants in western white and sugar pine forests	5,000
D. Educational activities to inform the public concerning blister rust and to secure its cooperation in applying measures for the control of this disease	10,000
Total	$160,000

Organization and Personnel

The present organization of the Western Branch of the Office of Blister Rust Control represents a transitional stage between close centralization, in which the work is all organized under direct supervision of the Spokane Office, and a decentralization into State units. On one hand there is a fairly close knit organization of project leaders permanently headquartered at Spokane. On the other hand this office has developed branches in those

states farthest from Spokane, with each branch under the immediate supervision of a State Leader. A start has been made, in several cases, of organizing all blister rust control work in these states under the supervision of the State Leader who, in turn, is responsible to the Spokane office.

The following is the permanent western personnel which was employed during the period covered by this report:

1. Supervisory: S. N. Wyckoff, Pathologist, in charge of Western Branch Office.

2. Project Leaders:

a. Quarantine Inspection, C. R. Stillinger, Associate Pathologist.
b. Experimental Ribes Eradication, Idaho, C. C. Strong, Junior Forester in charge , assisted by Frank Patty, Junior Pathologist.
c. Control Reconnaissance on Federal Lands, H. N. Putnam, Assistant Pathologist.
d. Control Demonstration on Private Lands, J. L. Bedwell, Assistant Pathologist, assisted by W. F. Painter, H. Whiting, G. Whiting, H. Geil, J. Rodner and R. Myers, Agents.
e. Ribes Ecological Studies, W. A. Rockie, Assistant Pathologist.
f. Experimental Chemical Eradication, H. R. Offord, Agent.
g. Educational work, C. R. Stillinger, Associate Pathologist.

3. State Leaders:

Montana, C. H. Johnson, Assistant Pathologist.
Oregon, L. N. Goodding, Assistant Pathologist.
California, G. A. Root, Assistant Pathologist, assisted by P. E. Melis, Junior Forester, W. V. Benedict, Junior Forester, and E. C. Kenyon, Agent.

4. Clerical Work:

R. Calhoun, Principal Clerk and Temporary Special Disbursing Agent.
Miss M. McWold, Clerk.
Mrs. L. Klatt, Assistant Clerk-Stenographer.
Mrs. D. Dow, Under Clerk-Typist.

Report of Work for Year

The following report is arranged as a series of state reports, under the heading of each of the five states in which this office has supervised work during the past year. The work is discussed under the several project headings. Each state report will consist of a general statement of the organization and activities in that state, the co-operative agreement under which the work was done, and the individual reports of the state and project leaders:

BLISTER RUST CONTROL WORK IN MONTANA
1926

Blister rust control work in Montana during the past year has consisted of two principal projects: (1) cultivated black currant eradication and (2) control reconnaissance work. In addition to the above there has been a certain amount of educational work done. These projects have been supervised by Mr. C. H. Johnson, Assistant Pathologist and State Leader for Montana. Through the cooperation of the Montana State Department of Agriculture, Mr. Johnson is given office space and facilities in the office of the Chief of the Division of Horticulture of that Department, in the Chamber of Commerce Building, Missoula, Montana. The following is the memorandum of understanding under the terms of which the work in Montana is organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE MONTAN STATE DEPARTMENT OF AGRICULTURE, THE MONTANA STATE FORESTRY DEPARTMENT, THE SCHOOL OF FORESTRY, UNIVERSITY OF MONTANA, AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN MONTANA.

EFFECTIVE JULY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Montana, the several cooperating agencies shall participate in a joint program as indicated below:

1. The Bureau of Plant Industry shall employ and direct the work of one or more men who shall assist in prosecuting the following cooperative activities: eliminating the cultivated black currant (Ribes nigrum) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods. The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement, and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

2. The Montana State Department of Agriculture shall pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of State and Federal blister rust quarantines; shall use its regular employees, so far as their other duties permit, and shall direct the work of its cooperating horticultural officials, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected blister rust host plants, in scouting for white pine blister rust, and in inspecting nurseries for this desease. It is recognized that the Montana State Department of Agriculture has no special appropriation for blister

rust control, and that therefore such blister rust control work as is performed by the employees of the Montana State Department of Agriculture and its cooperating horticultural officials will be done in connection with their other duties.

3. The Montana State Forestry Department shall use its regular employees, so far as their regular duties permit, in systematically locating cultivated black currants, in scouting for the blister rust, in taking such action as is deemed necessary in preventing the spread of blister rust into territory under their control and supervision, and in assisting in the performance of control reconnaissance and experimental local control.

4. The School of Forestry, University of Montana, shall assist the Bureau of Plant Industry and the other cooperators in the formulation and performance of control reconnaissance and experimental local control. It is further agreed that the School of Forestry, University of Montana, shall assign one member of its faculty to blister rust work during the field season, his salary and expenses to be paid by the Bureau of Plant Industry for such a period.

5. All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to the agreement. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Bureau of Plant Industry for final determination.

6. It is provided that from July 1, 1926 to June 30, 1927, inclusive, the Montana State Department of Agriculture and its cooperators shall expend about $5,000.00, the Montana State Forestry Department about $1,200.00, the School of Forestry, University of Montana, about $300.00, and the Bureau of Plant Industry about $ 5,000.00 in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall take effect July 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties to this agreement.

Date	Signatures
Nov. 5, 1926	(s.) A. H. Bowman Montana State Department of Agriculture

Date (Cont.)	Signatures (Cont.)
Nov. 8th, 1926	(s.) Rutledge Parker Montana State Forestry Department
Nov. 9th, 1926	(s.) Thos. C. Spaulding School of Forestry, University of Montana.
Nov. 23, 1926	(s.) Wm. A. Taylor Bureau of Plant Industry.

CULTIVATED BLACK CURRANT ERADICATION, MONTANA.

by

C. H. Johnson
Assistant Pathologist.

The campaign started four years ago to exterminate the black currants in Montana is ended. A very few bushes remain scattered throughout the State, which could not be removed at the time of their location for some good reason, such as the absence of owner, death of owner, inability of owner to understand English etc. However, such cases are not forgotten and progress is being made towards removal of the scattered plantings.

It is reasonably safe to say that the black currant issue will never again be revived in this State. Nothing short of a complete breakdown in our quarantine enforcement and powerful adverting by outside nurseries can again restore the former popularity of black currants. To one who has been engaged in the every day eradication and has been in a position to note every reaction, favorable and unfavorable, it is indeed gratifying to feel that all opposition to our program has faded away so quickly. The few growers who have agreed to remove their bushes within a period of five years are living up to their agreement.

The following tables show the status of the black currant situation at the end of 1926.

Plantings and Bushes Eradicated

Table No. I.

County	At Time of Location		At Subsequent Time		Total Plantings and Plants Eradicated	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Missoula *	88	540	11	316	99	856
Ravalli *	99	703	3	37	102	740
Flathead	46	205			46	205
Lake	29	160	2	17	31	177
Mineral	8	39			8	39
Sanders	9	56			9	56
Lincoln	16	121			16	121
Silver Bow	14	44			14	44
Powell	6	25	1	48	7	73
Granite			1	3	1	3
Deer Lodge	1	2			1	2
Cascade	42	212			42	212
Fergus	7	34			7	34
Hill	1	4			1	4
Liberty	No Plantings found					
Blaine	" "	"				
Toole	" "	"				
Yellowstone	14	74	2	18	16	92
Stillwater	2	5			2	5
Carbon	2	7			2	7
Musselshell	1	2			1	2
Park	6	36			6	36
Meagher	1	4			1	4
Gallatin	11	46			11	46
Broadwater	No Plantings found					
Golden Valley	" "	"				
Wheatland	" "	"				
Sweet Grass	" "	"				
Judith Basin	" "	"				
Choteau	" "	"				
Big Horn	" "	"				
Lewis & Clark	25	407	2	14	27	421
Beaverhead	3	19			3	19
Madison	11	19			11	19
Pondera	1	4			1	4
Glacier	1	3			1	3
Teton	4	46	1	4	5	50
Jefferson	3	28			3	28
Phillips	4	85			4	85
Valley	No Plantings found					
Roosevelt	5	76			5	76
Daniels	No Plantings found					
Sheridan	1	5			1	5
Richland	1	5			1	5
Wibaux	No Plantings found					
Fallon	" "	"				
Dawson	" "	"				
Prairie	" "	"				
McCone	" "	"				
Custer	2	8			2	8
Powder River	No Plantings found					
Carter	" "	"				
Rosebud	" "	"				
Treasure	1	47			1	47
Petroleum	No Plantings found					
Garfield	" "	"				
Totals	465	3071	23	457	488	3528

* In Missoula County 3 plantings representing 238 bushes are included in the 5 year agreement explained in my last annual report. Of this total, 100 bushes have been removed leaving 138 to be eradicated.

* In Ravalli County 3 plantings representing 122 bushes are included in special agreement. 25 bushes have been eradicated.

Table No. II.

Plantings and Bushes not Eradicated

County	Plantings	Plants	Owner not willing	Owners' attitude not specified
Missoula	2	22	1 planting 17 bushes dying neglect.	1 planting 5 bushes
Ravalli	1	5	Unwilling case not closed.	
Lake	1	17	Not consulted since proclamation issued.	
Flathead	1	15	Not consulted since proclamation issued.	
Silver Bow	3	17	Will be eradicated.	
Cascade	1	7	Not consulted since proclamation issued.	
Beaverhead	1	2	Not consulted since proclamation issued.	
Pondera	1	2	No reply from letter - bushes may be removed!	
Jefferson*	2	133	Not willing 1 planting 3 bushes	1 planting 130 bushes.
Roosevelt	1	12	Willing	
Sheridan	1	29	Owner could not under stand English.	
Totals	14	261		

* In Jefferson County the owner of 130 bushes died; unable at present to locate new owner.

CONTROL RECONNAISSANCE ON FEDERAL, STATE, AND PRIVATE LANDS, MONTANA, JULY 1 TO SEPTEMBER 11, 1926

by

C. H. Johnson, Assistant Pathologist

* * *

I. Purpose of Work

The field season of 1926 was the first time control reconnaissance has been performed in Montana. Previous to 1926, little was known concerning the location and extent of white pine areas and Ribes conditions thereon in Montana. Owing to this fact, the primary object of the first year's control reconnaissance was to make a systematic study of sample areas in each of the forests having white pine types, in order that plans for the complete reconnaissance of white pine types in Montana might be made.

Information desired on areas worked may be grouped into five major subdivisions as follows:

1. Timber types.
2. Timber age classes.
3. Eradication types.
4. Ribes per acre by species within each eradication type.
5. Physical factors affecting costs and methods of Ribes eradication.

II. Methods of Work

The methods of performing control reconnaissance in Montana were similar to those used on Federal and private lands of Idaho, full descriptions of which are shown in the annual report of the control reconnaissance work done in Idaho, 1926.

III. General Description of Areas

A. Accessibility.

All timbered areas which were reconnaissanced are readily accessible either by road or trail. On all future reconnaissance work in Montana it will be necessary to pack supplies and equipment to the scene of operation and remain until work is completed. The white pine areas as a general rule are isolated.

B. Forest Types Found.

The Douglas fir-larch type predominates in northwestern Montana. The white pine is very commonly found associated with the larch and Douglas fir. The more dense stands of white pine are confined to north and east exposures, in narrow draws and valleys. Other principal species found mixed with white pine are hemlock, cedar, alpine fir, Engelmann, spruce and white fir.

C. Age Classes.

The white pine areas suffered severely from the fire of 1910. Montana was almost stripped of this valuable species. Such timber as escaped the fire is confined to higher altitudes, pockets, draws and is mostly even aged, ranging from 100 years to 200 plus. In the areas heavily burned lodgepole pine has come up and is gradually building up the soil again. The 0-10 age class of white pine in such places is again making its appearance.

D. Ribes Conditions.

The four principal species of Ribes are R. lacustre, R. petiolare, G. inermis, and R. viscosissimum. R. petiolare thrives well along streams, particularly on better quality white pine sites. R. lacustre is found associated with R. petiolare along streams on rich quality white pine sites, extending also over the entire area, occurring in openings and clearings. G. inermis thrives better on the poorer soils and especially well in meadows and exposures which are not so well drained. R. viscosissimum is confined to dry and open sites.

IV. Results of Control Reconnaissance

During the past field season control reconnaissance in Montana was performed on areas in five national forests and one state forest.

A. Land Description of Areas Worked.

The locations and land descriptions of areas worked are shown in Table No. I.

Table No. 1

Land Description and Areas Reconnaissanced in Montana 1926

Forest	T.	R.	Intensive Reconn. Sections by No.	Intensive Reconn. Total Sects.	Intensive Reconn. Total Acres	Extensive Reconn. Sections by No.	Extensive Reconn. Total Sects	Extensive Reconn. Total Acres	Total Section	Total Acres
Kootenai	35 N	34 W	13,22,23	3	1920	11,12,14 15,21,24 25,26	8	5120		
National	36 N	32 W	19	1	640					
Forest	36 N	33 W	12,13	2	1280	1,2,11	3	1920		
Totals				6	3840		11	7040	17	10880
Stillwater	32 N	23 W	5,6,28, 5, 6, 18	3	1920					
State	33 N	23 W	16,17,18,19,20 29,30,33	8	5120					
Forest	33 N	24 W	11,13,14 23,24,	5	3200					
Total				16	10240				16	10240
Flathead	24 N	17 W	5,6,8,18, 19,25,26 31,36	9	5760					
National										
Forest	24 N	18 W	9,10,11, 12,13,14 15,16.	8	5120					
Totals				17	10880				17	10880
Missoula N.F.(N.P. Ry lands)	21 N	17 W	21,29	2	1280				2	1280
Cabinet National Forest	26 N	33 W	6,7,8,11 14,15,16 23,24	9	5760				9	5760
Lolo National Forest	18 N	30 W	4,8	2	1280					
	19 N	29 W	1,2,11, 12	4	2560					
	19 N	31 W	18,19,30	3	1920					
	19 N	32 W	4,8,9,13 14,23,24 N½25, N½ 26	9	5140					
	20 N	29 W	26,27,34 35	4	2560					
Totals				22	13460				22	13460
Grand Total				72	45460		11	7040	83	52500

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The results of the work performed for each forest and for all forests are shown in tabular form under the following headings:

1. Total number of acres reconnaissanced, classified according to white pine and non-white pine types, age classes and eradication types.

2. Number of acres intensively reconnaissanced, classified according to eradication types and number of Ribes per acre, classes for each Ribes species and for all Ribes species.

3. Distribution of Ribes by species.

4. Number of Ribes per acre by Ribes species and eradication types.

It may be observed that the total acreages in 1 and 2 are not necessarily the same. This is because data were not always taken on all of the acreage even on a section worked intensively, consequently the total acreage shown in 2 often is smaller than in 1.

Also, it may be noted that the acreage in 2 sometimes is greater than the acreage of white pine type in 1. This is because Ribes data were taken on non-white pine types adjoining white pine types, and acreage figures for such areas included.

B. Results of Control Reconnaissance Performed on Kootenai National Forest.

There were 6 sections intensively reconnaissanced on the Kootenai National Forest. Few Ribes were found. These consisted of 2 species -- R. lacustre and G. inermis -- chiefly along streams. On 3 sections, namely, Sections 13, 22 and 23, T 35N, R 34 W, in Meadow Creek drainage, no Ribes were found even along streams. The streams on these 3 sections are narrow, flowing through dense mature and dense pole stands.

Tables 2 to 7 inclusive show the results on reconnaissance on the Kootenai National Forest.

Table No. 2

Total Number of Acres Reconnaissanced
Kootenai National Forest, Montana, 1926.
Classified According to Age Classes and Eradication Types

Erad. Types	White Pine Type - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total
D. M.							1605	2255		3860							1720	1422	750	3892
O. M.																				
D. P.			1675	290						1965			250	40					333	623
O. P.																				
D. R.												410								410
O. R.																				
Str.			10				59	51		120							5	5		10
Brush																				
Clearing																				
Not Cla -ssified																				
Totals			1685	290			1664	2306		5945		410	250	40		-	1725	1427	1083	4935

Table No. 3

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana.

Erad Type	Number of Ribes lacustre per Acre Classes																						
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	3585																						3585
O. M.																							
D. P.	480																						480
O. P.																							
D. R.																							
O. R.																							
Stream	25												12	3	35	5							80
Brush																							
Total	4090												12	3	35	5							4145

Table No. 4

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana

Erad. Type	Number of G. inermis per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	3015	570																					3585
O. M.																							
D. P.	480																						480
O. P.																							
D. R.																							
O. R.																							
Stream	80																						80
Brush																							
Total	3575	570																					4145

Table No. 5

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana.

Erad. Type	Number of All Ribes Per Acre Classes																					
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	3015	570																					3585
O. M.																							
D. P.	480																						480
O. P.																							
D. R.																							
O. R.																							
Stream	25												12	3	35	5							80
Brush																							80
Total	3520	570											12	3	35	5							4145

Table No. 6

Distribution of Ribes by Species
Kootenai National Forest, Montana.

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	98.7 %	--- ---	1.3 %
G. inermis	86.2 %	13.8 %	-- ---
All Ribes	84.9 %	13.8 %	1.3 %

Table No. 7

Number of Ribes per Acre by Ribes Species and Eradication Types
Kootenai National Forest, Montana

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	3585				.8	.8
O. M.						
D. P.	480					
O. P.						
D. R.						
O. R.						
Str.	80	123.8				123.8
Brush						
Total & Averages	4145	2.4			.7	3.1

C. Results of Control Reconnaissance on the Stillwater State Forest, Montana

Tables 8 to 15 show the results of control reconnaissance on the areas worked in the Stillwater State Forest.

Four species of Ribes were found, namely R. lacustre, R. viscosissimum, R. petiolare, and G. inermis. There was a large acreage of dense pole stands found to be Ribes free. Large amounts of R. lacustre and R. viscosissimum were found in the open pole stands. These two species and G. inermis were numerous in the open reproduction stands. All four species of Ribes occurred on stream types. Over half of the area supported Ribes growth in excess of 10 plants per acre.

D. Results of Control Reconnaissance on the Flathead National Forest, Montana.

Tables 16 to 21 show the results of control reconnaissance on the Flathead National Forest, Montana.

Only 2 species of Ribes were found, namely, R. lacustre and G. inermis. These were chiefly confined to the stream type. Nearly 82 % of the area reconnaissanced was dense mature, and supported an average of less than 4 Ribes per acre. Only 2.7 % of the entire area reconnaissanced had more than an average of 10 Ribes per acre.

E. Results of Control Reconnaissance on Missoula National Forest, (Northern Pacific Land), Montana.

Tables 22 to 28 show the results of the work on the Missoula National Forest, Montana.

There were 3 species of Ribes found, namely, R. lacustre, R. petiolare, and G. inermis. The first two were found confined to stream type, and G. inermis was found only in dense mature stands. Only 1.7 % of the area, or that along streams, supported Ribes growth in excess of 10 per acre.

Table No. 8

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Stillwater State Forest, Montana 1926

Erad. Types	White Pine Type - Age Classes 1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total	Non-White Pine Type - Age Classes 1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total
D. M.							776			776							3987		1265	5252
O. M.																				
D. P.																470	530		1987	2987
O. P.																			222	222
D. R.																				
O. R.									148	148	65									65
Stream							28			28							420		36	456
Brush																			306	306
Clearing																				
Not Classified																				
Totals							804		148	952	65					470	4937		4016	9288

Table No. 9

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana.

Erad. Types	Number of Ribes lacustre per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	1261	2985	1382	400																			6028
O. M.																							
D. P.	2987																						2987
O. P.															222								222
D. R.																							
O. R.	25	40														148							213
Stream	36					8	32	10	5		320					25	12	34					482
Brush	128										25					153							306
Total	4437	3025	1382	400		8	32	10	5		345				222	326	12	34					10238

Table No. 10

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Types	Number of Ribes viscosissimum per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 251	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	2877	1195	1550	406																			6028
O. M.																							
D. P.	2987																						2987
O. P.																			222				222
D. R.																							
O. R.	65																			148			213
Stream	417		12	9	20	12					12												482
Brush	128								153									25					306
Total	6474	1195	1562	415	20	12			153		12							25	222	148			10238

Table No. 11

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Type	Number of Ribes petiolare per Acre Classes																					Total
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-600	751-1000	1001-1500	
D. M.	6028																						6028
O. M.																							
D. P.	2987																						2987
O. P.	222																						222
D. R.																							
O. R.	213																						213
Stream	454	28																					482
Brush	306																						306
Total	10210	28																					10238

Table No. 12

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana.

Erad. Type	Number of G. inermis per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	2787	2029	700						512														6028
O. M.																							
D. P.	2987																						2987
O. P.	222																						222
D. R.																							
O. R.	148	40																				25	213
Stream	69		12						13				320				10	30	6	22			482
Brush	306																						306
Total	6519	2069	712						525				320				10	30	6	22		25	10238

Table No. 13

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Type	Number of All Ribes Per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	175	1746	839	2756							512												6028
O. M.																							
D. P.	2987																						2987
O. P.																				222			222
D. R.																							
O. R.		40																			148	25	213
Stream													5	20		336	9	54	32	26			482
Brush	128																153			25			306
Total	3290	1786	839	2756							512		5	20		336	162	54	32	273	148	25	10238

Table No. 14

Distribution of Ribes by Species
Stillwater State Forest, Montana

Ribes Species	Percent of Total Acres reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	43.3 %	29.5 %	27.2 %
R. viscos.	63.2 %	11.7 %	25.1 %
R. petiol.	99.7 %	.3 %	---
R. inermis	63.7 %	20.2 %	16.1 %
All Ribes	32.1 %	17.4 %	50.5 %

Table No. 15

Number of Ribes per Acre by Ribes Species and Eradication Types
Stillwater State Forest, Montana.

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	6028	7.6	6.5		9.8	23.9
O. M.						
D. P.	2987					
O. P.	222	187.0	450.0			637.0
D. R.						
O. R.	213	157.3	434.3		147.6	739.2
Stream	482	112.8	5.8	.3	155.0	273.9
Brush	306	120.3	66.1			186.4
Total & Averages	10238	20.7	24.9	.01	16.1	61.7

Table No. 16

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Flathead National Forest, Montana 1926.

Erad. Type	White Pine Type - Age Classes										Non-White Pine Type - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total
D. M.							4400			4400							2690		390	3080
O. M.																			25	25
D. P.																				
O. P.																			40	40
D. R.																				
O. R.	50	120							335	505										
Stream							159			159										
Brush																			2551	2551
Clearing																			120	120
Not Classified																				
Totals	50	120					4559		335	5064							2690		3126	5816

Table No. 17

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	Number of Ribes lacustre per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	2220	2410																					4630
O. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.		505																					505
Stream	15			3		19					104	3	15										159
Brush	350																						350
Total	2610	2915		3		19					104	3	15										5669

Table No. 18

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	Number of G. inermis per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	3700	930																					4630
O. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.	505																						505
Stream	127			20		7								5									159
Brush	350																						350
Total	4707	930		20		7								5									5669

Table No. 19

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	Number of All Ribes Per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	1290	3340																					4630
O. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.		505																					505
Stream	10			3		2			10		111	3	5	15									159
Brush	350																						350
Total	1675	3845		3		2			10		111	3	5	15									5669

Table No. 20

Distribution of Ribes by Species
Flathead National Forest, Montana.

Ribes Species	Percent of Total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	46.0 %	51.4 %	2.6 %
G. inermis	83.0 %	16.4 %	0.6 %
All Ribes	29.5 %	67.8 %	2.7 %

Table No. 21

Number of Ribes per Acre by Ribes Species and Eradication Types
Flathead National Forest, Montana.

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	4630	2.6			1.0	3.6
O. M.	25					
D. P.						
O. P.						
D. R.						
O. R.	505	5.0				5.0
Stream	159	82.4			10.2	92.6
Brush	350					
Total & Averages	5669	4.9			1.1	6.0

Table No. 22

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Missoula National Forest, Montana, 1926 (N. P. Ry. Lands)

Erad. Types	White Pine Types - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total
D. M.									895	895										
O. M.																				
D. P.																			363	363
O. P.																				
D. R.																				
O. R.																				
Stream									22	22										
Brush																				
Clearing																				
Not Classified																				
Totals									917	917									363	363

Table No. 23

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest (N. P. Ry. Land) Montana.

Erad. Type	Number of Ribes lacustre per Acre Classes.																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	895																						895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream																10		12					22
Brush																							
Total	1258															10		12					1280

Table No. 24

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest (N. P. Ry. Lands) Montana

Erad. Types	Number of R. petiolare per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Totals
D. M.	895																						895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream											12		10										22
Brush																							
Total	1258										12		10										1280

Table No. 25

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest, (N. P. Ry. Lands) Montana

Erad. Type	Number of G. inermis per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	520	375																					895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream	22																						22
Brush																							
Total	905	375																					1280

Table No. 26

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
Missoula National Forest (N. P. Ry. Land) Montana

Erad. Type	Number of Ribes (All Species) per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	520	375																					895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream																		10	12				22
Brush																							
Total	883	375																10	12				1280

Table No. 27

Distribution of Ribes by Species
Missoula National Forest (N.P.Ry. lands) Montana)

Ribes Species	Percent of Total Acres Reconnaissanced which has		
	No. Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	98.3 %	0	1.7 %
R. petiola.	98.3 %	0	1.7 %
G. inermis	70.7 %	29.3 %	0
All Ribes	69.0 %	29.3 %	1.7 %

Table No. 28
Number of Ribes per Acre by Ribes Species and Eradication Types
Missoula National Forest (N. P. Ry. lands) Montana.)

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare.	G. inermis	All Ribes
D. M.	895				2.1	2.1
O. M.						
D. P.	363					
O. P.						
D. R.						
O. R.						
Stream	22	293.2		114.1		407.3
Brush						
Total & Averages	1280	5.0		2.0	1.5	8.5

F. Results of Control Reconnaissance on the Cabinet National Forest, Montana.

Tables 29 to 34 show results of the work on the Cabinet National Forest, Montana.

There were 2 species of Ribes found, namely, R. lacustre and G. inermis. These were confined to open mature and stream types. An average of less than 12 Ribes per acre was found on the stream type. Only 2.7% of the area reconnaissanced supported a Ribes growth in excess of 10 plants per acre.

G. Results of Control Reconnaissance on Lolo National Forest, Montana.

Tables 35 to 43 show the results of control reconnaissance on the Lolo National Forest, Montana.

Ribes were abundant and well distributed on the area reconnaissanced. There were found 4 species of Ribes, namely, R. lacustre, R. viscosissimum, R. petiolare, and G. inermis. R. lacustre was present in every eradication type. R. viscosissimum was confined to the dense and open mature types. R. petiolare was found only along streams. G. inermis was seen in the open reproduction and stream types. On 60.8 % of the area Ribes were found in excess of 10 plants per acre.

H. Summary of Results of all Reconnaissance Performed in Montana

Tables 43 to 51 show the results of all reconnaissance performed in Montana.

R. lacustre occurred in every eradication type. R. viscosissimum was found in every eradication type except the dense pole and dense reproduction types. R. petiolare was found confined to the stream type. G. inermis occurred in the dense mature, open mature, open reproduction, and stream types. Over 1/3 of the entire area reconnaissanced supported a Ribes growth of more than 10 Ribes per acre.

Table No. 51 is made up of preceding tables, and shows Ribes conditions by forests. It is apparent that there is a great variation in the number of Ribes per acre in the different forests, varying from an average of 1.4 Ribes per acre on the Cabinet National Forest, to 78.8 Ribes per acre on the Lolo National Forest.

R. lacustre and *G. inermis* occur on every one of the 6 forests. *R. viscosissimum* was found on the Stillwater State Forest, and Lolo National Forest. *R. petiolare* was seen on the Stillwater State Forest, Missoula National Forest, and Lolo National Forest.

The forests, namely the Stillwater State and Lolo National Forests, on which were found the greatest average number of Ribes per acre, also showed the highest percent of area on which there were found more than 10 Ribes per acre.

Table No. 29

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Cabinet National Forest, Montana 1926

Erad. Types	White Pine Type - Age Classes										Non-White Pine Type - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total
D. M.																	318			318
O. M.																			1278	1278
D. P.			2335							2335									470	470
O. P.			720							720										
D. R.																				
O. R.																				
Stream			317						2	319										
Brush																			160	160
Clearing																			160	160
Not Classified																				
Totals			3372						2	3374							318		2068	2386

Table No. 30

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana

Erad. Type	Number of Ribes lacustre per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.																							
O. M.	1158	438																					1596
D. P.	2885																						2885
O. P.	720																						720
D. R.																							
O. R.																							
Stream	67	250	2																				319
Brush	160																						160
Total	4990	688	2																				5680

Table No. 31

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana

Erad. Types	Number of G. inermis per Acre Classes																						
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.																							
O. M.	1158	438																					1596
D. P.	2885																						2885
O. P.	720																						720
D. R.																							
O. R.																							
Stream	167		150	2																			319
Brush	160																						160
Total	5090	438	150	2																			5680

Table No. 32

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana.

Erad. Type	Number of all Ribes per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.																							
O. M.	1158	438																					1596
D. P.	2885																						2885
O. P.	720																						720
D. R.																							
O. R.																							
Stream	65	100	2	152																			319
Brush	160																						160
Total	4988	538	2	152																			5680

Table No. 33

Distribution of Ribes by Species
Cabinet National Forest, Montana

Ribes Species	Percent of Total Acres reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	87.9 %	12.1 %	Trace (only 2 acres)
G. inermis	89.6 %	7.7 %	2.7 %
All Ribes	87.8 %	9.5 %	2.7 %

Table No. 34

Number of Ribes per Acre by Ribes Species and Eradication Types
Cabinet National Forest, Montana.

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.						
O. M.	1596	1.4			1.4	2.8
D. P.	2885					
O. P.	720					
D. R.						
O. R.						
Stream	319	4.0			7.2	11.2
Brush	160					
Total & Averages	5680	.6			.8	1.4

Table No. 35

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Lolo National Forest, Montana 1926

Erad. Type	White Pine Type - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total
D. M.							1795	1797		3592							305	2381	435	3121
O. M.								186		186								396		396
D. P.																	135		570	705
O. P.																			120	120
D. R.		760								760										
O. R.	2107	440								2547										
Stream	30	34					52	73	10	199										
Rock																				
Brush																				
Clearing																				
Not Classified																			1834	1834
Total	2137	1234					1847	2056	10	7284							440	2777	2959	6176

Table No. 36

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of Ribes lacustre per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	1826	425		475		340	240	207	260	365	360	1265	295		260								6318
O. M.	931	90	96																				1117
D. P.	945	333																					1278
O. P.	90															120							210
D. R.													335	240	185								760
O. R.	981										50	970	890			417		200					3508
Stream													23		37	17	28	74	12	8			199
Brush																							
Total	4773	848	96	475		340	240	207	260	365	410	2235	1543	240	482	554	28	274	12	8			13390

Table No. 37

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of Ribes viscosissimum per Acre Classes																					Total
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	
D. M.	4032	2201	85																				6318
O. M.	535	582																					1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3508																						3508
Stream	199																						199
Brush																							
Total	10522	2783	85																				13390

Table No. 38

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of R. petiolare per Acre Classes																					
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	6318																						6318
O. M.	1117																						1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3508																						3508
Stream											40	10	11		44	27	13	14	10	30			199
Brush																							
Total	13191										40	10	11		44	27	13	14	10	30			13390

Table No. 39

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Types	Number of G. inermis per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	6318																						6318
O. M.	1117																						1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3308			200																			3508
Stream	124			5	20	18	10				10		12										199
Brush																							
Total	13115			205	20	18	10				10		12										13390

Table No. 40

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of All Ribes per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	440	1451	425		390	360	240	207	260	365	360	1265	295		260								6318
O. M.	535	486		96																			1117
D. P.	945	333																					1278
O. P.	90															120							210
D. R.	98												335	240	185								760
O. R.	981										50	970	890			417		200					3508
Stream																		32	61	36	70		199
Brush																							
Total	2991	2270	425	96	390	360	240	207	260	365	410	2235	1520	240	445	537		232	61	36	70		13390

Table No. 41

Distribution of Ribes by Species
Lolo National Forest, Montana.

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	35.7 %	6.3 %	52.0 %
R. viscos.	78.6 %	20.8 %	0.6 %
R. petiol.	98.5 %	----	1.5 %
G. inermis	97.2 %	----	2.8 %
All Ribes	22.3 %	16.9 %	60.8 %

Table No. 42

Number of Ribes per Acre by Ribes species and Eradication Types
Lolo National Forest, Montana.

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	6318	58.8	1.9	---	---	60.7
O. M.	1117	1.7	2.6	---	---	4.3
D. P.	1278	1.3	---	---	---	1.3
O. P.	210	128.6	---	---	---	128.6
D. R.	768	157.0	---	---	---	157.0
O. R.	3508	113.8	---	---	1.4	115.2
Stream	199	291.0	---	263.5	24.0	578.5
Brush						
Total & Averages	13,390	73.1	1.1	3.9	.7	78.8

Table No. 43

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
All Areas Worked, Montana, 1926.

Erad. Types	White Pine Type - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+ 200+	Not Classified	Total
D. M.							8576	4052	895	13523							9020	3803	2840	15663
O. M.								186		186								396	1303	1699
D. P.			4010	290						4300			250	40		470	665		3723	5148
O. P.			720							720									382	382
D. R.		760								760		410								410
O. R.	2157	560							483	3200	65									65
Stream	30	34	327				298	124	34	847							425	5	36	466
Brush																			3017	3017
Clearing																			280	280
Not Classifi.																			1834	1834
Total	2187	1354	5057	290			8874	4362	1412	23536	65	410	250	40		470	10110	4204	13415	28964

Table No. 44

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number R. lacustre Per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	9787	5820	1382	875		340	240	207	260	365	360	1265	295		260								21456
O. M.	2114	528	96																				2738
D. P.	7660	333																					7993
O. P.	810														222	120							1152
D. R.													335	240	185								760
O. R.	1006	545									50	970	890			565		200					4226
Stream	143	250	2	3		27	32	10	5		424	3	50	3	72	57	40	120	12	8			1261
Brush	638										25					153							816
Total	22158	7476	1480	878		367	272	217	265	365	859	2238	1570	243	739	895	40	320	12	8			40402

Table No. 45

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number Ribes viscosissimum per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	16019	3396	1635	406																			21456
O. M.	2156	582																					2738
D. P.	7993																						7993
O. P.	930																		222				1152
D. R.	760																						760
O. R.	4078																			148			4226
Stream	1196		12	9	20	12					12												1261
Brush	638								153									25					816
Total	33770	3978	1647	415	20	12			153		12							25	222	148			40402

Table No. 46

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number of Ribes petiolare per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	21456																						21456
O. M.	2738																						2738
D. P.	7993																						7993
O. P.	1152																						1152
D. R.	760																						760
O. R.	4226																						4226
Stream	1012	28									52	10	21		44	27	13	14	10	30			1261
Brush	816																						816
Total	40153	28									52	10	21		44	27	13	14	10	30			40402

Table No. 47

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana

Erad. Type	Number of G. inermis Per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	16340	3904	700						512														21456
O. M.	2300	438																					2738
D. P.	7993																						7993
O. P.	1152																						1152
D. R.	760																						760
O. R.	3961	40		200																		25	4226
Stream	589		162	27	20	25	10		13		10		332	5			10	30	6	22			1261
Brush	816																						816
Total	33911	4382	862	227	20	25	10		525		10		332	5			10	30	6	22		25	40402

Table No. 48

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Types	Number All Ribes Per Acre Classes																						
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	5440	7482	1264	2756	390	360	240	207	260	365	872	1265	295		260								21456
O. M.	1718	924		96																			2738
D. P.	7660	333																					7993
O. P.	810															120				222			1152
D. R.													335	240	185								760
O. R.	981	545									50	970	890			417		200			148	25	4226
Stream	100	100	2	155		2			10		111	3	22	38	35	341	9	96	105	62	70		1261
Brush	638																153			25			816
Total	17347	9384	1266	3007	390	362	240	207	270	365	1033	2238	1542	278	480	878	162	296	105	309	218	25	40402

Table No. 49

Distribution of Ribes by Species
All Areas Reconnaissanced, Montana

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	54.8 %	18.5 %	26.7 %
R. viscos.	83.6 %	9.8 %	6.6 %
R. petiol.	99.4 %	.1 %	.5 %
G. inermis	83.9 %	10.8 %	5.3 %
All Ribes	42.9 %	23.2 %	33.9 %

Table No. 50

Number of Ribes per Acre by Ribes Species and Eradication Types
All Areas Reconnaissanced, Montana

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	21456	20.0	2.4		3.2	25.6
O. M.	2738	1.5	1.1		.8	3.4
D. P.	7993	.2				.2
O. P.	1152	59.5	86.7			146.2
D. R.	760	157.0				157.0
O. R.	4226	103.0	21.9		8.6	133.5
Stream	1261	113.4	2.2	43.7	66.1	225.4
Brush	816	45.1	24.8			69.9
Total & Averages	40402	30.6	6.7	1.4	4.7	43.4

Table No. 51

Comparison of Ribes Data by Forests, Montana

Forest	Acres Intensively Reconn.	% of Total Acres Reconn. which has			Average No. of Ribes by Species per Acre.				
		No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre	R. lac.	R. viscos.	R. pet.	G. inermis	Total Ribes
Kootenai Nat'l Forest	4145	84.9%	13.8 %	1.3 %	2.4			.7	3.1
Stillwater State Forest	10238	32.1 %	17.4 %	50.5 %	20.7	24.9	.01	16.1	61.7
Flathead Nat'l Forest	5669	29.5 %	67.8 %	2.7 %	4.9			1.1	6.0
Missoula Nat'l Forest (N.P.Ry land)	11280	69.0 %	29.3 %	1.7 %	5.0		2.0	1.5	8.5
Cabinet Nat'l Forest	5680	87.8 %	9.5 %	2.7 %	.6			.8	1.4
Lolo National Forest	13390	22.3 %	16.9 %	60.8 %	73.1	1.1	3.9	.7	78.8
All Areas	40402	42.9 %	23.2 %	33.9 %	30.6	6.7	1.4	4.7	43.4

V. Costs of Control Reconnaissance - Montana, 1926.

Table No. 52 shows the cost of the work done in Montana.

Table No. 52

Costs of Control Reconnaissance, Montana July 1 to September 11,1926.

Name	Salary	Sub-sistence	Personally Owned Auto	Equip-ment	Freight	Total
Johnson, C. H.	532.50	144.75	52.15			729.40
Skeels, Dorr	591.67	111.05	180.67			883.39
Misc. vouchers				18.22	1.63	19.85
Total	$1124.17	$255.80	$232.82	$18.22	$1.63	$1632.64

The expense of personally owned auto and subsistence for Skeels are those for July and August only. His expense account for September had not been sent in at the time this report was written.

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Sections worked} \quad 83} = \$19.67 \text{ cost per section}$$

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Acres Reconn.} \quad 52{,}500} = \$\ .031 \text{ cost per acre}$$

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Man Days} \quad 146} = \$11.18 \text{ cost per man day}$$

$$\frac{\text{Total Acres Worked} \quad 52{,}500}{\text{Total Man days} \quad 146} = 360 \text{ acres per man day}$$

VI. Permanent Control Reconnaissance Records

The information and maps obtained on control reconnaissance have been put into uniform, permanent forms similar to the permanent records of reconnaissance performed in Idaho. A description of the methods used in making such permanent records is given in this year's annual report on "Control Reconnaissance, Federal Lands, Idaho."

SCOUTING FOR THE DISEASE, NORTHWESTERN MONTANA

By

C. H. Johnson
Assistant Pathologist

Scouting was conducted in Northwestern Montana along the principal drainages and in such places where the occurrence of blister rust might be detected. As yet no evidence of the rust has been found in this state. The following table shows the result of this scouting.

Scouting for the Disease, Northwestern Montana
September, 1926.

Locality	Ribes Inspected					
	R. nigrum	R. petiolare	R. lacustre	G. inermis	G. setosa	All Ribes
Yaak River and Tributaries		100	360	40		500
Bull River		50	210	82		342
Thompson River and Clarks Fork		360	140	90		590
Black foot Riv. Missoula River & Tributaries	100	560	160	80	200	1100
Flathead and Swan Lakes	25	630	312	240		1207
Stillwater River		62	800	160		1022
Kootenai River	5	56	561	220		842
Totals	130	1818	2543	912	200	5603

Blister rust exhibits were shown at the State Fair at Helena, Montana and western Montana Fair at Missoula.

BLISTER RUST CONTROL WORK IN IDAHO
1926

Blister rust control work in Idaho during the past year has been organized under a number of different projects, namely: cultivated black currant eradication, experimental Ribes eradication, control reconnaissance on Federal lands, cooperative demonstration on private timber lands, experimental chemical eradication, ecological studies, educational work and scouting for the disease.

The first of the above mentioned projects was supervised by Mr. A. W. B. Kjosness, Commissioner of Agriculture for the State of Idaho. All other projects were directly supervised from the Spokane office. The following is the memorandum of understanding under the terms of which the work in Idaho has been organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE IDAHO STATE DEPARTMENT OF AGRICULTURE, THE UNIVERSITY OF IDAHO, THE STATE BOARD OF FORESTRY, THE POTLATCH TIMBER PROTECTIVE ASSOCIATION, THE CLEARWATER TIMBER PROTECTIVE ASSOCIATION, THE COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION, THE PEND OREILLE TIMBER PROTECTIVE ASSOCIATION, THE PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION AND THE BUREAU OF PLANT INDUSTRY OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN IDAHO.

EFFECTIVE JULY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Idaho, the several cooperating agencies shall participate in a joint program as indicated below.

1. The Bureau of Plant Industry shall employ and direct the work of one or more men who shall assist in prosecuting the following cooperative activities: eliminating the cultivated black currant (*Ribes nigrum*) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods. The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement, and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

2. The Idaho State Department of Agriculture shall employ one or more men who shall assist in eliminating the cultivated black currant from the State by systematically locating and securing the destruction of these plants; inspect plant shipments, in cooperation with the Federal Horticultural Board and Bureau of Plant Industry, to detect and prevent violations of State and Federal blister rust quarantines; scout for blister rust; and inspect nurseries in the state growing currants, gooseberries or white pines.

3. The Idaho State Board of Forestry shall cooperate through its deputized agents, in so far as their other duties will permit, in systematically locating cultivated black currants, scouting for blister rust and locating infected or potentially infected host plants. It shall also cooperate directly in so far as it is able and as the necessity arises in promoting and assisting in the various blister rust control activities carried on in the state.

4. The University of Idaho, through the several departments here enumerated, agrees to cooperate as follows: The School of Forestry, University of Idaho, agrees to detail one member of its staff to cooperative white pine blister rust control work throughout the field season and to allow him sufficient time during the remainder of the year to generally supervise such work in Idaho. Furthermore the School of Forestry, University of Idaho, agrees to continue to study on the rate of growth of western white pine remaining on areas after logging and a study to determine expected yields of second growth white pine stands. The Department of Plant Pathology of the University of Idaho Agricultural Experiment Station agrees to examine all specimens suspected of being infected with the white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the United States Bureau of Plant Industry for final determination. The Extension Division of the University of Idaho College of Agriculture shall use its regular employees, in so far as their other duties may permit, in locating cultivated black currants and other infected or potentially infected blister rust host plants, and in giving publicity to the campaign to eradicate black currants and to other means of preventing the introduction and spread of white pine blister rust in Idaho.

5. The Potlatch Timber Protective Association, the Clearwater Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, and the Priest Lake Timber Protective Association shall cooperate by contributing the services of their employees, in so far as their other duties will permit, to assist in systematically locating cultivated black currants, scouting for the rust within the boundaries of their respective associations, and in general investigations to secure complete information concerning the age and amount of white pine second growth

on logged-off and burned-over lands within the boundaries of their respective associations; and to determine by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands, as a basis of determining the cost and feasibility of local control of blister rust on these lands.

6. All official records showing work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to the other parties. All specimens collected or received by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Department of Plant Pathology, University of Idaho, for critical determination.

7. It is provided that from July 1, 1926, to June 30, 1927, the Idaho State Department of Agriculture shall expend about $2000.00, the University of Idaho about $4000.00, the Clearwater Timber Protective Association about $3,300.00, the Coeur d'Alene Timber Protective Association about $4,100.00, the Potlatch Timber Protective Association about $3,800.00, the Pend Oreille Timber Protective Association about $3,800.00, and the Bureau of Plant Industry about $34,600.00, in the course of this work. All expenditures made by the Bureau of Plant Industry, shall be in accordance with the fiscal regulations of the United States Department of Agriculture.

8. This memorandum of understanding shall take effect July 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties concerned.

Date	Signature
Nov. 15, 1926	(s) A. W. B. Kjosness, Commissioner Idaho State Department of Agriculture
March 10, 1927	(s) F. G. Miller, Dean, School of Forestry University of Idaho
March 15, 1927	(s) Ben E. Bush State Board of Forestry.
March 15, 1927	(s) A. W. Laird, President Potlatch Timber Protective Association
March 15, 1927	(s) Theo Fohl Clearwater Timber Protective Association

Date (Cont.)	Signature (Cont.)
March 15, 1927	(s) Sig Hofslund Coeur d'Alene Timber Protective Association.
March 14, 1927	(s) T. L. Greer Pend Oreille Timber Protective Association
3/19/27	(s) J. Jensen Priest Lake Timber Protective Association
	Bureau of Plant Industry, U. S. Department of Agriculture.

REPORT ON BLACK CURRANT ERADICATION WORK IN IDAHO.

by
C. R. Stillinger
Associate Pathologist

* * *

The eradication of the black currant in Idaho during the summer of 1926 was carried out as a cooperative project between the Bureau of Plant Industry, United States Department of Agriculture and the Idaho State Department of Agriculture. This project has been executed on a dollar for dollar basis of expenditure as provided for in paragraph one of the Memorandum of Understanding for the period of July 1, 1925 to June 30, 1926, and paragraph two of the Memorandum of Understanding for the period of July 1, 1926 to June 30, 1927.

Object of the Project

The object of the project has been to continue the thorough eradication of the cultivated black currant in that portion of Idaho remaining to be worked.

Personnel

Three two-man crews, each with a Ford car, made up the personnel. Messrs. Robertson, Haga, Crouch, Callender, Stewart, and Patch were the individuals employed. Mr. Patch was in charge of the work in the field. The work was supervised by the Idaho State Department of Agriculture, Boise, Idaho.

Division of Expense

The following division of the expense was made for the period of the work in the field, June 7 to September 1, 1926:

The Bureau of Plant Industry, United States Department of Agriculture paid the following:

(1) Salary for four men.
(2) Field expenses for six men.
(3) Expense for the gas and oil for the cars.

The Idaho State Department of Agriculture paid the following:

(1) Salary for two men.
(2) Furnished three Ford cars.
(3) Reimbursed the owners of the cultivated black currants for their bushes.

The following tables give the budgets and moneys expended on this project for the summer of 1926.

Table No. I.

Funds Expended

	U. S. Department of Agriculture		Idaho State Department of Agriculture	
	June	July-August	June	July-August
Salary	320	840	200	400
Expense	481.25	1462.34	0	0
Reimbursement to C.B.C. Owners	0.0	0.0	0	308.55
Total	801.25	2302.34	200	*708.55

*This does not include any allowance for the cars which were owned by the State.

Table No. II.

Balance

	U. S. Department of Agriculture		Idaho State Department of Agriculture	
	June	July-August	June	July - August
Fund Available	1046.23	2090	?	?
Expense	801.25	2302.34	200	708.55
Balance	244.98	-212.34	?	?

Territory Worked

The work was completed in the following counties or portions thereof:

Payette	County	- Completed.	
Canyon	"	- 9/10 done.	Other part completed last year.
Owyhee	"	- 1/3 done.	Other part completed last year.
Jefferson	"	- Completed.	
Madison	"	- 9/10 done.	Rest uncompleted.
Bonneville	"	- 1/2 done.	Rest uncompleted.
Bingham	"	- Completed.	
Power	"	- Completed.	
Bannock	"	- 2/3 done.	Rest uncompleted.
Fremont	"	- County worked before. One planting found near Fremont-Madison county line.	

The following counties or portions thereof remain to be done:

Madison - 1/10
Teton - All
Bonneville - 1/2
Caribou - All
Bannock - 1/3
Bear Lake - All
Franklin - All
Oneida - All

From the number of plantings found in the counties adjoining these, it is fairly safe to estimate that a full three months working period with three two-man crews will be required to finish the work.

Results

The following table gives the results of the work according to counties, number of plantings, plants, and costs for reimbursement.

Table No. III.

County	Number Plantings	Number Plants	Cost per Bush										Total Cost
			$.00		$.25		$.35		$.40		$.50		
			Plantings	Plants	Plantings	Plants	Plantings	Plants	Plantings	Plants	Plantings	Plants	
Canyon	28	118	22	98	2	7					4	13	$ 8.25
Payette	5	26	2	18							3	8	4.00
Bannock	50	611	44	480	2	94					4	37	42.00
Bingham	222	2284	209	2123	3	41	2	20			8	100	67.25
Bonneville	141	1345	133	1151	1	11			1	77	6	106	86.55
Jefferson	60	605	59	588							1	17	8.50
Power	14	207	11	175	1	8					2	24	14.00
Fremont	1	11	1	11									.00
Madison	117	1353	110	1197							7	156	78.00
Total	638	6560	591	5841	9	161	2	20	1	77	35	461	$308.55

The following table gives some idea of the size of the plantings which were eradicated during this last summer.

Table No. IV.

No. bushes in planting	No. plantings	No. bushes in planting	No. plantings	No. bushes in planting	No. plantings	No. bushes in planting	No. plantings	No. bushes in planting	No. plantings
1	47	12	17	23	3	34	2	54	2
2	66	13	13	24	5	35	4	56	1
3	72	14	15	25	2	37	2	60	2
4	64	15	18	26	2	38	2	61	1
5	42	16	12	27	5	41	3	62	1
6	32	17	7	28	2	43	1	68	1
7	33	18	8	29	1	44	1	74	1
8	31	19	7	30	2	45	1	76	1
9	30	20	3	31	4	47	1	77	1
10	28	21	3	32	3	51	1	87	1
11	21	22	6	33	2	53	1	103	1
Total									638

FIELD REPORT OF THE WORK DONE BY METHODS CREWS
AT BLISTER RUST CAMPS 2 and 3

Priest River, Idaho.
June 17, 1926 - September 4, 1926.
by

William C. Thompson,
Field Assistant.

* *

Introduction

This report summarizes the field work of the methods crews at Blister Rust Camps 2 and 3, Priest River, Idaho, for the 1926 season. It contains field procedure, details of Ribes eradication experiments and general tabulations of the results, which should be useful when the field notes are reworked later. Data to show the efficiency of Ribes eradication is recorded. A complete analysis of the methods study notes can not be made until the eradication crews final 1926 reports supply figures for the number of Ribes pulled per block and per type.

Purpose of Methods Work

The purpose of methods work in blister rust control is three fold: (1) to check crew Ribes eradication efficiency, (2) to improve the present methods of eradication, and (3) to collect the necessary field data to furnish quantitative evidence as proof of the superiority of certain Ribes eradication methods.

Itinerary and Personnel

The methods work at Blister Rust Camp 1 was in charge of P. S. Simcoe and that at Camps 2 and 3 was in charge of W. C. Thompson. A brief diary of the season follows:

June 17, P. S. Simcoe and W. C. Thompson went from Spokane to Camp 1.
June 21, C. R. Fullerton, C. Guptill, H. B. Mathany, F. Simcoe, H. E. Swanson and R. Young reported for methods work at Camp 1.
June 22-25, training the methods crew at Camp 1, working two advance and two strip checks. Performing laying trail experiment.
June 25, W. C. Thompson, H. E. Swanson, and R. Young moved to Camp 2 on Binarch Creek.
July 1, H. W. Swanson began methods work at Camp 3 with R. E. Hungate as assistant.
July 6, Leo Zon began methods work at Camp 2.
July 13, Camp 3 crews left to fight forest fires in the Upper Priest country. Camp 2 crews departed for the Larsen fire in the evening.
August 15, Camp 3 crews returned from fire fighting.
August 16, Camp 2 crews returned from fire fighting.
September 1, R. E. Hungate resigned to resume his teaching duties at Sprague, Wn. H. E. Swanson moved to Camp 2. P. S. Simcoe, F. Simcoe and C. R. Fullerton moved to Camp 2. September 4, W. C. Thompson went to Spokane. Simcoe took charge of the combined crews at Camp 2.

It will be noticed that the methods men were divided into camps: P. S. Simcoe, F. Simcoe, H. B. Mathany, C. R. Fullerton, and C. Guptill at Camp 1; W. C. Thompson, R. Young, and L. Zon at Camp 2; and H. E. Swanson and R. E. Hungate at Camp 3. This division of forces made it frequently.

necessary to use the regular eradication crews work as part of experiments.

The salary scale for Camps 2 and 3 methods men was as follows: Thompson $180 per month, Swanson $95, Young $80, Hungate $70, Zon $70.

Description of Area

Blister Rust Camp 2 crew, under the direction of B. A. Anderson, eradicated about 3300 acres in the lower drainage of Binarch Creek. Stream type with from 198 to 1904 Ribes per acre and open pole type with from 2 to 768 Ribes per acre prevailed. The valley and its emerging draws were relatively narrow and the slopes were steep. The north exposures of the hills were entirely wooded in contrast to the open pole type of the south exposures, which were covered in places with rocks, low shrubs, and grass. Ribes viscosissimum occurred on the north slopes but the south ones were practically Ribes free (less than 10 bushes per acre or less than 40' live stem per acre - arbitrary unit). C. Strong stated that the ecological factor in this case was probably moisture, rather than frost, lack of seeds, or soil constituents. In the late spring he found snow on the north side and dust on the south side of the ridges. Ribes lacustre and Ribes inermes were abundant in the stream type. The upper Binarch Creek valley has some of the best white pine stands (100% pure and of middle age classes) in the Kaniksu National Forest. The Ribes should be eliminated from that district in the immediate future.

Blister Rust Camp 3 crew, under the direction of William Guernsey, eradicated Ribes in the lower Lamb Creek drainage just north of the Binarch Creek area. In it was an extensive flat region of sandy soil with lodgepole pine which was Ribes free. For a chain on each side of Lamb Creek in the stream type, Ribes inermes were found at the rate of about 500 bushes per acre. In part of this type the Ribes were burned off to the ground in April 1926. By July many of the crowns had vigorous sprouts. This would make a good plot for ecological study. About one third of the Camp 3 area is a slope with a northeast exposure and open pole type which had about 500 Ribes viscosissimum per acre.

The eradication men have drawn maps of the respective areas and their report will include the following data which will be useful to methods study: acreage, number and species of eradicated Ribes, and the time of eradication. All of these will be arranged by block and type. The checking data of this report can very easily be applied to the general data of the whole type. B. A. Anderson drew a map of his area at Camp 3 and located on it all of the methods crew plots with numbers corresponding to those in the field notes.

Crew Methods

In an extensive area of similar type conditions an 8-man eradication crew was useful in the 6-2 formation. The interval between the men in line depended upon the Ribes concentration and upon the density of the undergrowth, but was about 10 feet on the average. Small pieces off magazine paper which were strewn on the ground by the end man of the front eradication line, marked the boundary of the strips in systematic eradication. The Ribes were pulled by hand. In narrow draws and stream bottoms

a four or five man crew with a foreman behind the line was used. Hillsides were usually worked up and down the slopes. At Camp 3, because the efficiency of the crew on the down slope was so poor, the strips were worked up the hill and along the contour instead.

Since a large percentage of the area worked this season might be classified as almost Ribes free, there was much work for the scouts and the scout crews. Several scout eradication methods were in use. At Camp 2 the scout (camp boss) went over the ground first to see what the Ribes conditions in general were. Ribes were found in the draws but in decreasing numbers up the hill therefrom. The scout kept a four-man crew busy in the draws while he himself pulled Ribes farther up the slopes where the concentration of Ribes had "run out". The area eliminated by the scout as Ribes free was not worked. Camp 3 method was as follows: Two scouts went over the area in strips about 5 chains apart to determine the places where the number of Ribes present justified crew eradication. A four or five-man crew was put to work in the "patches" of Ribes as soon as they were located. P. S. Simcoe is trying out scout crew methods on 75 acres at Camp 2 now.

The eradication crews went to work in the morning on the government time and returned to camp in the evening on their own time.

The numbers of pulled Ribes were reported to the foreman by the men at the end of each strip. The same inaccuracy of count due to split bushes was evident this season as in other years. Here are some of the figures for the number of bushes, which were taken from the advance check plots:

Table No. I.

Camp No.	Methods count	Eradication Report
2	532	189
	768	2886
	170	703
	220	972
	668	1465
	543	1009
	198	582
	456	56
3	717	670
	75	62
	624	840

The error is large, sometimes positive and sometimes negative. Instead of the errors just balancing one another, the eradication report seems to be too high. Here is a possible solution to the problem if its performance does not slow up the eradication. The crew men will notify the foreman each time the tenth Ribes has been pulled and the foreman will keep track of each ten as a unit on a tally register. This method should give more accurate eradication reports and therefore more accurate strip check figures.

The Daily Crew Record (Form 8-4432; BR 28) is not carried by the foreman into the field, but is kept neat for a permanent office record. For a while the foreman kept the number of Ribes pulled by the men on a scrap of paper in an unsystematic manner and then in the evening he filled in the Daily Crew Record notebook. I suggested the use of field notebook 8-299, ruled as shown in the accompanying sample, to be used instead of the scrap of paper. This form arranges the eradication data by block, strip, and type, which is a valuable aid in checking later. It was used in the field at Camp 2 during the 1926 season with satisfactory results.

Sample

Date - 9-1-26

Foreman - A. Quine
Ass't. Foreman - C. Adams   Locality - Camp 2, Block 2

Name	Strip 1, Type OR			Strip 2, Type DR			Strip 2, Type OR			Strip 3, Type OR			
	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	Total
A. Quine	25	1	0	7	2	0	9	2	2	27	4	0	79
C. Adams	20	0	0	10	2	1	11	4	0	32	3	0	83
B. Rogoway	16	2	0	10	3	0	13	19	3	30	0	1	97
C. Bernard	28	0	0	4	0	0	27	27	0	25	3	0	114
M. Deters	30	4	0	15	4	2	9	30	0	19	1	0	114
Total Ribes	119	7	0	46	11	3	69	82	5	133	11	1	487
Acreage	1.2			0.5			0.5			1.0			3.2
Crew Hours	2.0			3.5			1.0			1.5			

Checking

One of the duties of the methods organization was to check the efficiency of Ribes eradication. Two kinds of checks were used at Camps 2 and 3, the advance plot and the strip checks.

The advance check plots were small areas, located in many parts of the block in order to be representative, which were gone over by the methods crew before eradication. The following data were obtained in this preliminary check; the number, height, live stem, and species of the Ribes present. After the eradication crew had worked over the plot, a final check of the missed bushes on it was made by the methods crew. The success of this kind of a check depended upon how typical the plots were of the whole block. One-tenth-acre plots were too small; 0.5 acres in a long plot was better; and a complete strip across the block was best. Advance check plots were marked in several ways; by natural boundaries as streams, by small blazes on trees, by using a crew strip boundary as a base line for the plot, and by using paper or string marked strips (when the trails were laid in advance of the crews.)

Following is a tabulated result of the advance checks which were made at Camps 2 and 3 this season:

Table No. II

Summary of the Advance Checks
Camps 2 and 3.

Camp No.	Block	Type	Acreage Checked	Difficulty of Working	Preliminary Ribes Count per A.	Ribes Eradicated per A.	Ribes Missed per A.	L. S. Missed per A.	Efficiency Based on No. of Ribes	Efficiency Based on Feet L.S.	Man Hours to Eradicate per A.
2	1	OR	0.50	15	532.0	189.0	16.0	46.0	97.0	99.0	11.2
2	1	OP	0.37	34	768.0	2886.0	51.0	150.0	93.4	97.9	64.8
2	1	OP	0.60	27	170.0	703.0	2.1	51.7	88.0	92.3	32.7
2	2	OP	0.50	18	456.0	56.0	36.0	220.0	92.1	90.1	5.0
3	2	OP	0.40	11	717.0	670.0	47.5	78.7	93.4	96.0	18.7
3	2	OP	1.50	13	75.3	62.6	26.0	60.3	74.3	78.4	10.4
2	1	S	0.20	21	222.0	972.0	30.0	132.5	88.0	97.6	45.0
2	3	S	0.40	26	1688.0	1465.0	72.5	255.0	90.4	95.4	20.9
2	3	S	0.70	26	543.0	1009.0	78.5	79.0	86.0	94.8	7.3
2	3	S	1.10	26	198.2	581.8	10.0	63.2	95.7	96.4	11.9
3	1	S	0.25	3	624.0	840.0	12.0	12.0	98.1	99.5	

The second kind of check used was the strip check. It was essentially the same as an advance check except that there was no preliminary check before eradication. The accuracy of the strip check depended upon the exactness of the eradication crew Ribes count and the estimated acreage. The strip plots varied in width from 1/4 to 1/2 chains and ran diagonally across the contour of the block at intervals of 12.5 chains, where the topography permitted. At least 2% of the total area of the block was checked to determine the missed Ribes and the missed live stem.

Following is a summary of the strip checks made during the 1926 season at Camps 2 and 3:

Table No. III.

Summary of Strip Checks
Camps 2 and 3.

Camp No.	Block	Type	Acreage Checked	Difficulty of Working	Ribes Eradicated per A.	Ribes Missed per A.	L. S. Missed per A. Ft.	Efficiency Based on Number of Ribes(%)	Man Hours to Eradicate per A.
2	1	OR	0.50	13	48.0	4.0	13.0	92%	8.5
2	1	DR	1.50	21	732.0	22.2	40.5	96	31.1
3	1	DR	1.60	23	20.0	19.0	86.8	41	1.7
2	1	OP	2.30	16	23.0	5.6	15.0	80	4.8
2	1	OP	0.36	34	163.0	33.0	77.7	81	16.6
2	1	OP	3.00	26	2.5	4.0	18.0	55	0.3
2	2	OP	9.00	31	31.5	2.0	12.0	94	1.1
2	2	OP	3.88	24	85.9	8.5	55.0	91	7.3
3	2	OP	1.00	11	1327.0	10.0	24.5	99	20.0
3	2	OP	1.00	19	231.0	48.0	48.0	92	6.0
3	2	OP	2.35	14	1169.0	45.0	73.8	96	13.8
3	2	OP	1.00	21	569.0	70.0	199.0	89	15.0
3	2	OP	2.20	25	553.0	23.0	69.3	96	12.0
3	2	OP	1.35	17	393.0	33.0	111.5	92	10.4
3	1	OP	3.20	13	222.0	4.0	21.4	98	7.9
3	1	OP	0.40	5	56.0	0.0	0.0	100	1.4
2	3	S	6.80	26	1234.0	245.0	129.0	97	22.6
2	3	S	3.00	26	1804.0	45.0	143.0	98	34.6
2	3	S	10.30	26	912.0	26.0	93.0	97	16.2
2	3	S	4.40	26	529.0	28.0	126.0	95	11.1
2	3	S	1.20	26	365.0	27.0	49.0	93	26.6
2	3	S	0.90	26	410.0	11.0	23.0	97	7.2
2	1	S	0.75	14	244.0	16.0	68.0	94	18.0
2	1	S	0.50	19	972.0	38.0	453.0	96	45.0
3	1	S	1.00	13	444.0	17.0	135.0	96	15.0
3	1	S	1.50	10	368.0	31.0	155.3	92	7.2
3	1	S	0.40	12	61.0	63.0	181.0	49	4.0

Forms WF-22BRC-5-22-26 and WF-21BRC-5-22-26, shown on Page No's. ___ and ___, which are used for checking purposes were supplemented by forms shown on Page Nos. ___ and ___. It will be noted that the new form has a place for the eradication crew report as well as for the methods crew data.

WF-22-BRC-5-22-26

Ribes Check - - Type Record

TYPE				Difficulty of Working	Foreman Worked by Scout
State				Percent of Slope $\overline{4}$	Checked by
Unit				Density of Brush $\overline{4}$	Date
Type Area				Density of Windfall $\overline{4}$	Time
Ribes pulled on Type				Density of Rockcover $\overline{4}$	Percent of Check
Species	All Bushes	Over 6"	Over 12"	Age Class	Applied to
				Density of Timber	Feet Live Stem Pulled on Type
				Location of Plot	
				Strip	
Total				Time Spent Eradicating	

Plot or Strip No.	Area of Plot or Strip	Ribes Species	Height of Bushes over Feet of Live Stem	Total F.L.S.	Total Ribes Checked

WF-21BRC-5-22-26

Site of Missed Ribes

Site	Number of Missed Ribes			
				Total
Rock out-crops				
Raised ground adjacent mature trees				
Damp slope				
Alder bottoms				
Upturns				
Windfalls, under, or behind				
Dry draws				
On decayed stumps or logs				
Mulch of decayed branches				
In dense brush				
On creek banks				
Covered by pulled Ribes				
Total				

Relation of Missed Ribes to Adjacent Brush (or Reproduction)

Height of Ribes	Number of Missed Ribes			
				Total
Hidden by brush				
Partially hidden by brush				
Visible above brush				
No brush near Ribes				
Total				

Note: Are missed Ribes of general or localized distribution.

Table No. IV.

Advance Check Plot

Unit: Camp 2. Block: 1

State: Idaho

Location: Foot of rock slide on east slope of high hill S. of Camp 2.

General Data.-

Type	Acres	% Slope	% Brush	% Wind-fall	% Rock	Diff'y of work	Age Class	Ave. Crown Density	Acres Repre-sented	Flora
OR	0.5	4	24	12	20	15	O-M	3		Ninebark, Rubus, Alder, Etc.
Total	0.5	4	24	12	20		O-M	3		

Date: 6-27-26 Time: 9:00 - 11:40

Crew: Thompson, Swanson, Young.

Preliminary count.

Type	Species	No. of Seedlings	Number of Ribes 6"-12"	12"	Total	Total L. S.	Ave. L. S. per Bush	No. of Ribes per Acre	Ave. L. S. per Acre	Man Days to Work
	lac.	21	0	193	193	1908'	9.8'	286	3816.0	
OR	vis.	0	0	73	73	504	6.9	146	1008.0	1.0
Total	--	21	0	266	266	2412	9.0	532	4824.0	1.0

Date: 6-28-26 Time: 7-12 1-4 Foreman: A. Quine Crew Size: 7.

Table No. IV-A

Advance Check Plot

Eradication Report.-

Type	Acreage	Species	No. of Ribes Eradicated	No. of Ribes Eradicated per Acre	Total Man Days	Man Days per Acre	
OR	5.0	lac. vis.	677 270	139 54	7.0	1.4	.
Total	5.0		947	189	7.0	1.4	

Date 6-29-26 Time 12:45 - 1:55 Crew: Swanson, Young.

Final Check.-

Type	Species	No. of Missed Seed-lings	Number of Missed Ribes			Total Missed L. S.	Ave. LS per Missed Bush	No. of Ribes Missed per A.	Ave. Missed L. S. per A.	% Efficiency Based on		Man Days to Work
			6"-12"	12"	Total					No. of Ribes*	L. S.	
OR	lac. vis.	0 0	0 0	6 2	6 2	19 4	3'.2 2.0	12 4	38'.0 8 .0	96.9 97.2	99.0 99.0	0.29
TOTAL		0	0	8	8	23	2.9	16	46.0	97.0	99.0	0.29

*In preliminary count.

W. C. Thompson

The following table shows the site of 1654 missed Ribes:

Table No. V.

Site of Missed Ribes

Site	Camp 2				Camp 3				Grand Total
	R. lac	R. vis	G. iner	Total	R. lac	R. vis	G. iner	Total	
Rock Outcrops	9	5	0	14	1	6	0	7	21
Raised ground, base of trees	65	3	0	68	8	8	5	21	89
Damp slope	13	0	0	13	1	43	0	44	57
Alder bottoms	15	0	1	16	14	0	1	15	31
Upturns	36	6	1	43	12	4	1	17	60
Windfalls	114	12	7	133	7	1	6	14	147
End of strip	8	0	0	8	2	0	0	2	10
Decayed stumps and logs	233	7	10	240	29	88	11	128	368
Mulch of Decayed Branches	171	17	12	200	36	173	20	229	429
Dense Brush	79	9	8	96	9	20	4	33	129
Creek banks	7	0	0	7	1	0	2	3	10
Covered by pulled Ribes	18	0	5	23	1	4	1	6	29
Opening in Brush	113	15	1	129	0	3	4	7	136
Pine Needle Carpet	1	0	0	1	0	0	0	0	1
Dry slope	0	0	0	0	4	40	1	45	45
On trail	58	14	2	74	4	2	2	8	92
Not visible from above	0	0	0	0	0	0	0	41*	0
Trampled under foot	0	0	0	0	0	0	0	10*	0
TOTAL	940	88	47	1075	129	392	58	579	1654

* Not included in totals

Relation to Surroundings.-

Hidden by brush	99	10	3	112	14	53	12	79	191
Partially hidden by brush	429	31	23	483	44	150	15	209	692
Visible above brush	96	17	9	122	31	81	10	122	244
No brush near Ribes	316	30	12	358	36	113	20	169	527
TOTAL	940	88	47	1075	125	397	57	579	1654

Experiments

The experimental methods work this season was severely handicapped by the loss of 35 days when fighting forest fires.

Root and Crown Study

At Camp 2, 100 Ribes lacustre, which were at the foot of a rock slide on a steep hillside, were marked with chalk on the rocks in such a way that the eradication crew would not notice the connection between the numerals and the Ribes. The eradication crew pulled all the bushes and left the following root parts in the ground but exposed to view:

Table VI.

No. of Exposed Crown Pieces left in Ground	Ave. Diam. of Exposed Crown Pieces	Total Exposed Length of Crown Pieces	No. of Exposed Root Pieces left in Ground	Ave. Diam. of Exposed Root Pieces	Total Exposed Length of Root Pieces
8	0.6"	27.0"	33	0.25"	449".0

About six weeks after eradication, the parts left in the ground were inspected and the sites of the 100 Ribes were marked by painted numbers on the rocks. No live Ribes growth was evident on the plot. The six week interval was dry and hot.

At Camp 3, in the alder stream type along Lamb Creek Ribes inermes were found and eradicated at the rate of 500 per acre. Fifty days after eradication (all but the last four days were dry) 0.4 acres were checked over and 19 Ribes inermes plants were found to have sprouted. These Ribes parts were removed from the ground and were measured with the following results:

Number of plants alive 19
Number of sprouts 54
Average length of root per plant . . . . 3.1 ft.
Average length of exposed root per plant . . . . 1.9 in.
Average height of sprouts . . . . 3.2 ft.
Number of plants with surface roots 15
Number of plants with tap roots 4

On the east side of Lamb Creek at Camp 3 in the same alder stream type as the other root and crown study plot, the following measurements were made of live Ribes growth after eradication. The Ribes parts were left in the ground for future inspection to determine sprout survival and growth.

Number of live plants 54
Number of sprouts. 101
Average height of sprouts . . . . 1.5 in.
Old live stem left . . . . 17 in.

Number of exposed root or crown pieces. 57
Average diameter of root or crown pieces . . . . . 0.16 In.
Average exposed length of root or crown piece . . 2.9 in.

54 plants on 1.8 acres which were checked, in 30 Ribes per acre or 6% of the 500 original plants per acre. Perhaps tools could have been used to advantage in this type.

Up vs. Down Hill Eradication

In the open pole type of 28% slope and a medium amount of undergrowth at Camp 3, the Ribes efficiency of strip eradication up hill was compared with that down. A five man eradication crew was used. The strip boundaries were marked with small pieces of paper strewn along the ground. The Ribes were pulled by hand. The results are shown in the table:

Table No. VII.

	No. of Strips	Acres	Man Days per Acre	Ribes Eradication per Acre	Ribes Missed per Acre	L. S. Missed per Acre	Percent Efficiency Based on Ribes
Up hill	2	1.00	2.18	1123	32	34.0'	97.2
Down hill	3	1.35	1.39	1200	87	103.3	93.2

Close observations of the site of missed Ribes showed that 41 out of 118 missed bushes were not visible from the slope above the bush. Ten Ribes were trampled under foot by the workers in coming down the hill. Twenty missed bushes were on the paper trail in the down hill strip as compared with 2 missed Ribes on the uphill strip. Although this check is on a small acreage, it indicates that more care should be taken in down hill eradication. P. S. Simcoe says that if the eradication men look back up the hill for Ribes frequently when they are working the down hill strip, the eradication efficiency will be much more satisfactory.

Influence of Wet Brush on Ribes Eradication

Of four adjacent strips in stream type, two were eradicated in the morning of August 20, 1926, when the undergrowth was still wet from the previous day's rain. About noon when the brush had dried off the two remaining strips were eradicated by the same crew. The efficiency of eradication which was determined by methods crew checks over the entire four strips is represented in the following table. Although the experiment was performed on a small scale, it is interesting and should be tried on a more extensive plot next season.

Table No. VIII.

Efficiency of Eradication in Wet and in Dry Brush

Camp 2
See Plot 18

Date Eradicated	Strip No.	Acreage	Species	No. of Ribes Reported Pulled	No. of Ribes Pulled per Acre	No. of Missed Seedlings	Number of Missed Ribes: 6"-12" High	Number of Missed Ribes: Over 12" High	Number of Missed Ribes: Total Excl. Sdlgs	Total L. S. Missed Ribes	Ave. L.S. per Missed Ribes	L.S. Missed per Acre	No. Ribes Missed per Acre	Efficiency on No. of Ribes	No. Missed Ribes on Trail	No. of Times off Trail	Man Days per Acre to Eradicate
Eradicated in Wet A.M.																	
8-20-			R. lac.	230		2	3	14									
26	D	0.6	G. iner.	29	431	0	0.	0	17	37.0	2.2'	61'	28	93.9	0	0	4.16
			R. lac.	145		0	3	10									
	E	0.6	G. iner.	34	297	0	1	2	16	22.0	1.4	37	17	92.3	0	1	2.50
			R. lac.	375		2	6	24									
Total		1.2	G. iner.	63	365	0	1	2	33	59.0	1.8	49	27	93.1	0	1	3.33
Eradicated in Dry P.M.																	
8-20-			R. lac.	108		0	1	4									
26	I	0.5	G. iner.	0	216	0	0	0	5	8.5'	1.7	17	10	95.6	1	3	1.00
			R. lac.	257		1	1	4									
	J	0.4	G. iner.	4	653	0	0	0	5	12.0	2.4	30	13	98.0	0	0	0.80
			R. lac.	365		1	2	8									
Total		0.9	G. iner.	4	410	0	0	0	10	20.5	2.1	23	11	97.4	1	3	0.90

Efficiency Before and After Fires

Methods crew checks of the Ribes eradication work of Camp 2 crews prior to and after forest fire fighting shows that there was no pronounced change in the eradication efficiency. The following table requires no explanation.

Table No. IX.

Before and After Fire Efficiency

Camp 2
Strip Plot Checks (See 18)
Block 3.
Stream Type
Adjacent to Laying Trail Exp.

8 Man Crew
Paper Trail Laid by Crew.
Strips were 1 Chain Wide.

Date Eradicated	Strip No.	Acreage	Species	No. of Ribes Reported Pulled	No. of Ribes Pulled per Acre	No. of Missed Seedlings	Number of Missed Ribes 6"-12" High	over 12" High	Total Excl. Sdlgs	Total L.S. Missed Ribes	Ave. L.S. per Missed Ribes	L.S. Missed per Acre	No. Ribes Missed per Acre	Efficiency on No. of Ribes	No. Missed Ribes on Trail	No. of Times off Trail	Man Days per Acre to Eradicate
Before Forest Fire Season.-																	
7-9-26	A		R. lac.	3021		19	10	59									
		1.5	G. iner.	0	2014	0	0	5	74	253.5	3.4'	169'	49	97.6	3	3	5.33
7-10-			R. lac.	2392		4	8	51									
26	B	1.5	G. iner.	0	1595	0	0	1	60	176.5	2.9	118	40	97.6	5	1	3.33
			R. lac.	5413		23	18	110									
Total	-	3.0	G. iner.	0	1804	0	0	6	134	430.0	3.2	143	45	97.6	8	4	4.33
After Forest Fire Season.-																	
8-20-			R. lac.	230		2	3	14									
26. AM	D	0.6	G. iner.	29	431	0	0	0	17	37.0	2.2'	61'	28	93.9	0	0	4.16
8-20-			R. lac.	145		0	3	10									
26 AM	E	0.6	G. iner.	34	297	0	1	2	16	22.0	1.4	37	17	94.6	0	1	2.50
8-20-			R. lac.	108		0	1	4									
26 PM	I	0.5	G. iner.	0	216	0	0	0	5	8.5	1.7	17	10	95.6	1	3	1.00
8-20-			R. lac.	257		1	1	4									
26 PM	J	0.4	G. iner.	4	653	0	0	0	5	12.0	2.4	30	13	98.0	0	0	0.80
			R. lac.	740		3	8	32									
Total	-	2.1	G. iner.	67	384	0	1	2	43	79.5	1.9	38	21	94.8	1	4	2.39
Total Before and After.-																	
			R. lac.	6153		26	26	142									
G. Total	-	5.1	G. iner.	67	1219	0	1	8	177	509.5	2.9'	99'	34	97.1	9	8	3.53

Laying Trail Equipment

Introduction:- The usual method of marking the boundary of the completed strip in systematic Ribes eradication by strewing small pieces of paper along the ground at frequent intervals has not been altogether satisfactory. In hopes of overcoming its two disadvantages, namely delaying the forward motion of the crew by the lagging affect of the trail maker and the poor efficiency of the trail maker himself, ordinary white grocer's string was used as a trial. This twine sells at retail for .46¢ per lb. and one roll contains two pounds. The cost of the paper for a trail can be found in the 1925 methods crew report by J. L. Bedwell.

Procedure

The string which was carried on the back in the holder (see diagram) was laid in compass lines one chain apart before the eradication crew began work. Paper pieces (2" x 2.5") were strewn on the ground in compass lines one chain apart, also ahead of the crew. A combination of the latter trail and larger sized paper pieces (6" x 8") which were hung on tree branches and brush twigs at frequent intervals, was called the combination paper trail. A comparison of these three trails, laid ahead of the crew in strips one chain wide, and of the regulation paper trail as laid by one of the crew members at the time of eradication, was made on the basis of time to lay trail and Ribes eradication efficiency.

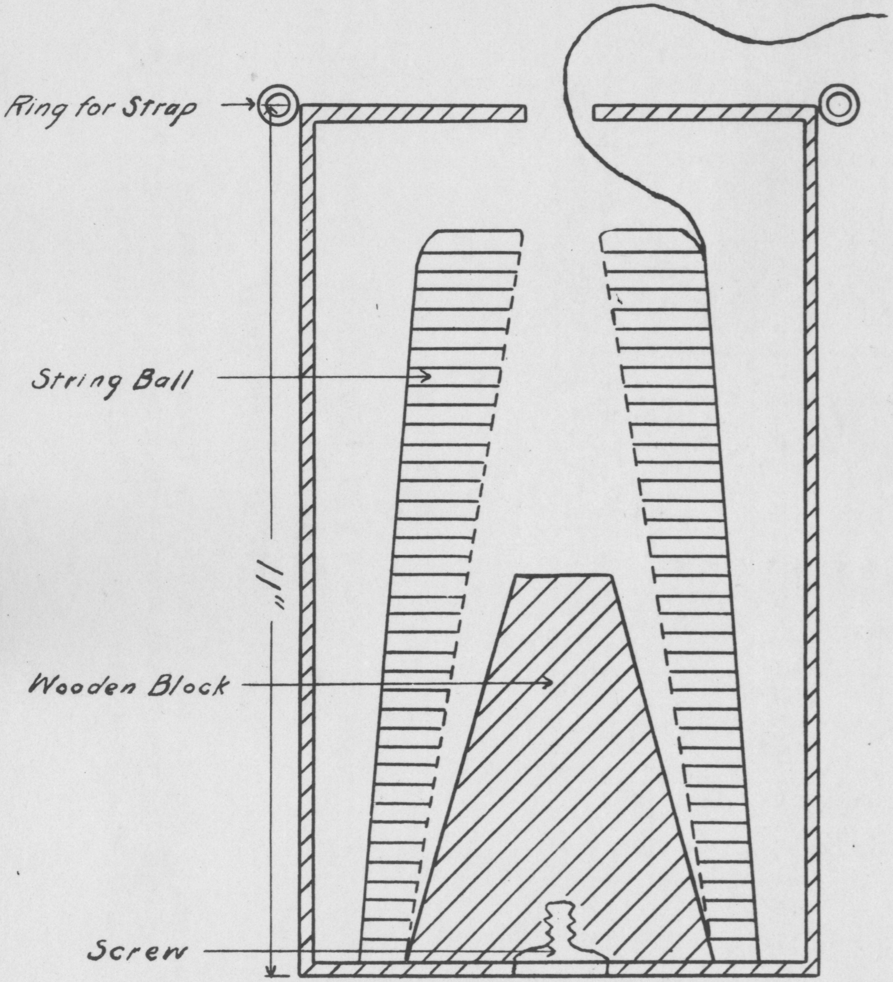
The experiment, when first tried on a small scale in the 30-35 year old burn south of camp 1, was of little value because the number of Ribes per acre was too small to give a satisfactory measure of efficiency. But the data on time to lay the trail is of value. At camp 3, string and paper plots were checked in advance of the crew, but to date they have not been eradicated. Until this is done and the final check is made, the data on these plots will be of no use except to compare the time of laying the different trails.

At Camp 2, the string (1 chain strips and also 0.5 chain strips) and the paper trails laid ahead of the crew on compass lines were compared with the regular 8-man crew (6-2 formation) which laid paper trail as it eradicated. The same 8-man crew was used throughout the experiment. The Ribes were hand pulled. Ralph Young laid trails ahead of the crew. The entire area was checked. 2.20 acres of advance check plots were used in the experiment.

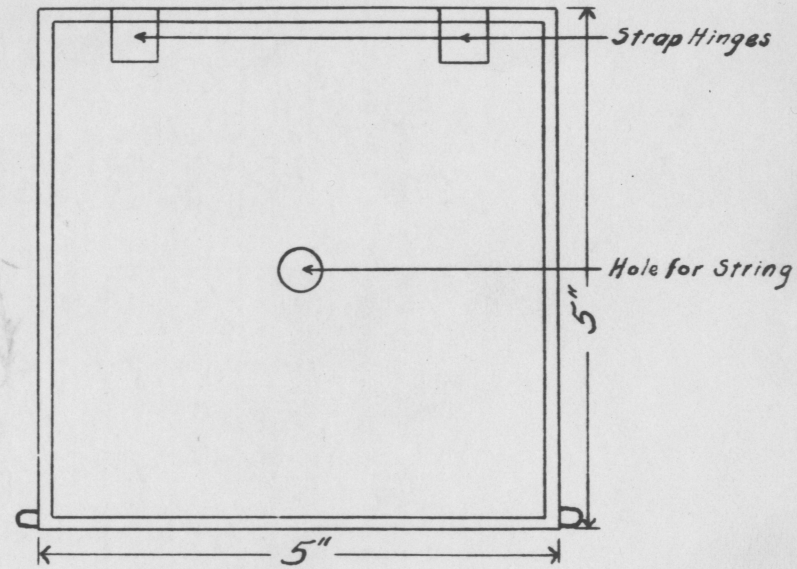
Description of the Area

Field data collected on Block 3, Camp 2, were used in this experiment. Block 3 includes strips 1 to 14 inclusive and strips A to K inclusive (see map in field notes). Block 3 is 25.4 acres of stream type, flat, with dense brush, with mature timber in places, and with light to average shade. The flora consisted of white pine(50%), cedar, fir, hemlock, larch, thornapple, maple, willow, dogwood, service berry, devil's

DIAGRAM OF STRING HOLDER



Longitudinal Cross Section



Top View

club, ferns, pyrola, skunk cabbage, nettles, thimbleberry, and Solomon's seal. The forest floor was needle covered to a depth of 2 inches, had an inch of duff, and there was sand and gravel underneath.

Cost of Laying Trail

The time to lay the different trails is shown separately and collectively for Camps 1, 2, and 3 by types in the accompanying table:

Table No. X.

Laying Trail Experiment

Trail	Type	Unit No.	Interval Between Lines	Minutes to Lay Trail per Mile	Length of Trail	Number of Parallel Trails	Minutes to Lay Trail
String	Stream	1	1 ch.	137.6	7.7	4	13.3
		2	1 ch.	229.6	88.0	5	253.0
		3	1 ch.	80.0	4.0	2	4.0
		Total	1 ch.	216.0	99.7		270.3
	O. R.	1	1 ch.	84.8	47.0	4	50.0
	D. R.	1	1 ch.	60.0	4.0	4	3.0
	O. P.	3	1 ch.	53.2	57.0	2	38.0
	D. P.	3	1 ch.	69.6	39.0	2	34.0
	Total		1 ch.	95.2	246.7		395.3
	Stream	2	0.5 ch.	122.4	108.0	5	165.0
2" x 3.5" Paper on Ground	Stream	1	1 ch.	152.0	14.1	4	28.0
		2	1 ch.	232.0	122.0	5	329.0
		3	1 ch.	106.4	6.0	2	8.0
		Total	1 ch.	204.8	142.1		365.0
	O. R.	1	1 ch.	296.0	10.4	4	39.0
	D. R.	1	1 ch.	200.0	20.0	4	51.0
	O. P.	3	1 ch.	95.2	68.0	2	81.0
	D. P.	3	1 ch.	156.8	26.0	2	51.0
	Total		1 ch.	176.0	266.5		587.0
Combination Paper Trail	Stream	1	1 ch.	280.0	10.0	4	35.0
	O. R.	1	1 ch.	232.2	36.0	4	105.0
	D. R.	1	1 ch.	336.0	11.3	4	48.0
	Total		1 ch.	262.4	57.3		188.0

The complete results to show the efficiency of eradication in the Camp 2, experiment are tabulated below:

Table XI.

Laying Trail Experiment - Camp 2.
- Efficiency of Eradication -
Figures Based on Eradication Crew Count.

Blocks
Stream Type

String 1 Chain — 8-man Crew

Strip No.	Acre-age	Species	No. of Ribes Report-ed Pulled	No. of Ribes per Acre	Number of Missed Ribes: Sdlgs. Under 6" High	6"-12" High	Over 12" High	Total Sdlgs Excl-uded	Total L. S. Missed Ribes	Ave. L. S. per Missed Ribes	L. S. Miss-ed per Acre	No. Ribes Missed per Acre	% Effi-ciency based on No. of Ribes	No. Missed Ribes on Trail	No. Times off Trail	Man Days to Eradi-cate per A.	Remarks
		R. lac.	2214		5	9	49										Compare these fig-ures with Advance Check in Strip 3 Which re-presents String Strips
1	1.5	G. iner.	86	1533	0	0	2	62	253.0'	4.1'	168'	41	97.4	2	0	3.67	
		R. lac.	1362		4	14	35										
2	1.8	G. iner.	345	948	0	0	1	50	180.5	3.6	100	28	97.1	2	0	2.92	
		R. lac.	2286		4	4	69										
3	1.7	G. iner.	203	1465	0	0	1	74	256.0	3.5	151	44	97.0	3	0	2.62	
		R. lac.	1561		4	12	43										
4	1.8	G. iner.	332	1052	0	0	4	59	180.0	3.0	100	33	96.9	1	0	2.22	
		R. lac.			17	39	196										
Total	6.8	G. iner.	8389	1234	0	0	8	245	879.5	3.9	129	36	97.2	8	0	2.82	
Paper (1 ch. strip) (Laid ahead of eradication crew)																	
		R. lac.	1658		0	12	59										Compare with ad-vance Check in Strip 8 which re-presents all 4 paper Strips
6	2.5	G. iner.	140	719	0	0	1	72	282.5	3.9	113	28	96.2	11	0	1.70	
		R. lac.	2382		7	18	37										
7	2.6	G. iner.	519	1116	0	1	5	61	191.5	3.1	74	24	97.9	7	1	1.96	
		R. lac.	2590		4	15	55										
8	2.7	G. iner.	135	1009	0	0	8	78	297.5	3.8	110	29	97.2	9	0	2.45	
		R. lac.	1724		3	7	43										
9	2.5	G. iner.	248	789	0	1	9	60	190.5	3.1	76	24	97.0	7	0	2.00	
		R. lac.			14	52	194										
Total	10.3	G. iner.	9396	912	0	2	23	271	962.0	3.6	93	26	97.1	34	1	2.03	
String (1/2 ch. Strip) (Laid ahead of eradication crew)																	
		R. lac.	797		1	4	31										Compare with Strip 13 Advance Check which Represents all 4 of these Strips
11	1.1	G. iner.	0	725	0	0	2	37	88.5'	[illegible]'	80	34	96.6	9	0	1.57	
		R. lac.	511		7	7	26										
12	1.1	G. iner.	54	514	0	1	9	43	158.5	3.7	144	39	92.9	11	0	1.59	
		R. lac.	438		4	2	8										
13	1.1	G. iner.	202	582	0	0	1	11	69.5	6.3	63	10	95.7	4	0	1.48	
		R. lac.	278		4	1	27										
14	1.1	G. iner.	49	297	0	0	2	30	238.5	7.9	217	27	91.5	10	0	0.91	
		R. lac.	2024		16	14	92										
Total	4.4	G. iner.	305	529	0	1	14	121	555.0	4.6	126	28	95.0	34	0	1.39	
Paper* (1 ch. strip) (Trail laid by crew at time of eradication) See Plots 18. 8-man Crew.																	
		R. lac.	5413		23	18	110										
A. B.	3.0	G. iner.	0	1804	0	0	6	134	430.0'	3.2	143	45	97.6	8	4	4.33	

*For Strips A. & B. separately, see "Before and After Fire" strip plot check 18.

The advance check plots of the laying trail experiment at Camp 2, are summed up in the following table:

Table No. XII.

Description	Difficulty of working	Preliminary Count Ribes per Acre	Ribes Eradicated per Acre	Ribes Missed per Acre	L. S. Missed per Acre	Efficiency Based on No. of Ribes	Efficiency Based on L. S.	Man Hours to Eradicate per Acre	Area Checked
String 1 Chain Wide	26	688.0	1465.0	72.5	255.0	90.4	95.4	20.9	0.40
Paper 1 Chain Wide	26	543.0	1009.0	78.5	79.0	86.0	94.8	7.3	0.70
String 0.5 Ch. Wide	26	198.2	581.8	10.0	63.2	95.7	96.4	11.9	1.10

Permanency of the Trails

The string and paper trails were laid at Camp 2 on July 8-10, 1926. Observations were made as to their condition on August 20, 1926, after the return from fighting fires. During the interval there was no rain until August 16, and then a heavy rain occurred. The ground was not dried out on August 20.

The condition of the string trail was good. It was still strong, up off the ground, and easily visible. It had been broken (probably by deer) 14 times in 196 chains of trail; but in no case would time have been lost by the crew in following the broken ends. The time to repair the string lines was 13 minutes.

The condition of the paper was not as bad as though there had been more rain in the interval between July 9 and August 20. The paper pieces were difficult to locate among the ferns and seemed to have disintegrated there

Difficulty of Working

It seems that the present difficulty factor tells part of but not all of the story. A scheme for the determination of eradication efficiency, has supplemented that factor. That question will not be considered here, but will be presented in a separate paper to be written later. Two tables which show the relationship between the present difficulty factor, the eradication efficiency and the time of eradication will be included here in order to place the information on record.

Table No. XIII.

Relation of Difficulty Factor to Eradication Efficiency

Camp No.	Plot No.	Type	Difficulty of Working	Acres Checked	Man Hours per Acre to Eradicate	Total Ribes per Acre	% Efficiency Based on No. of Ribes	% Efficiency Based on L. S.	L. S. Missed per Acre
2	14	S	26	6.80	22.6	1479	97		129.0
2	15	S	21	0.20	45.0	220	88	97	255.0
2	22	S	19	0.50	45.0	1010	96		453.0
2	21	S	14	0.75	18.0	260	94		68.0
3	5	S	13	1.00	15.0	461	96		135.0
3	17	S	12	0.40	4.0	124	49		181.0
3	8	S	10	1.50	7.2	399	92		155.3
3	14	S	3	0.25		624	98	99	12.0
2	10	OP	34	0.37	64.8	768	98		150.0
2	8	OP	34	0.36	16.6	196	81		77.7
2	17	OP	31	9.00	1.1	34	94		12.0
2	12	OP	27	0.60	32.7	705	88	92	51.7
2	9	OP	26	3.00	0.3	7	55		18.0
3	11	OP	25	2.20	12.0	576	96		69.3
3	6	OP	21	1.00	15.0	639	89		199.0
3	3	OP	19	1.00	6.0	279	92		48.0
2	23	OP	18	0.50	5.0	456	92	90	5.0
3	12	OP	17	1.35	10.4	426	92		111.5
2	7	OP	16	2.30	4.8	29	80		15.0
3	4	OP	14	2.35	13.8	1214	96		73.8
3	5	OP	13	3.20	7.9	226	98		21.4
3	9	OP	13	1.50	10.4	75	74	78	60.3
3	1	OP	11	0.40	18.7	717	93	96	78.7
3	2	OP	11	1.00	20.0	1337	99		24.5
3	17	OP	5	0.40	1.4	56	100		0.0
2	5	OR	15	0.50	11.2	532	97	99	46.0
2	11	OR	13	0.50	8.5	52	92		13.0
3	17	DR	23	1.60	1.7	39	41		86.8
2	16	DR	21	0.90	31.1	754	96		150.0

Table No. XIV.

Relation of Ribes per Acre to Cost

Type	Ribes Per Acre	Man Hours per Acre	Difficulty Factor	Camp No.	Plot No.
S	1479	22.6	26	2	14
OP	1337	20.0	11	3	2
OP	1214	13.8	14	3	4
S	1010	45.0	19	2	22
OP	768	64.8	34	2	10
DR	754	31.1	21	2	16
OP	717	18.7	11	3	1
OP	705	32.7	27	2	12
OP	639	15.0	21	3	6
S	624		3	3	14
OP	576	12.0	25	3	11
OR	532	11.2	15	2	5
S	461	15.0	13	3	5
OP	456	5.0	18	2	23
OP	426	10.4	17	3	12
S	399	7.2	10	3	8
S	260	18.0	14	2	21
OP	226	7.9	13	3	5
S	220	45.0	21	2	15
OP	196	16.6	34	2	8
S	124	4.0	12	3	17
OP	75	10.4	13	3	9
OP	56	1.4	5	3	17
OR	52	8.5	13	2	11
DR	39	1.7	23	3	17
OP	34	1.1	31	2	17
OP	29	4.8	16	2	7
OP	7	0.3	26	2	9
O					

Note: Try plotting the Ribes per acre times man hours per acre.

Time and Cost Data

The monthly time records of Mr. Calhoun will show the division of time for the methods men (and eradicators as well) between the different projects. In case that the actual time for each experiment is required, it may be found in the Ribes field sheets. Time is usually expressed in man days and the cost per day is computed at the end of the season.

Future Methods Work

From various sources have been assembled ideas for methods of Ribes eradication. Perhaps it would be worth while to test out some of these plans next summer.

I. Should a scout crew use a one or two line formation and where should the foreman be located?

II. Find the relative efficiency and cost for trained eradicators and for those with little experience.

III. Is color blindness of eradicators a reason for missing Ribes?

IV. Find a scheme for eradicating "patches" of Ribes that are concentrated on one side of the strip.

V. What are the best sized crews for narrow and for wide stream bottoms?

VI. Eradication crew bush count reported to the foreman when every tenth bush has been pulled

VII. Should the eradication crew members use a stick for beating down the brush in a swamp when looking for Ribes?

VIII. Can an eradication crew do efficient work at Ribes eradication in wet brush?

REPORT ON THE PROGRESS OF THE
CHEMICAL ERADICATION OF RIBES

by

H. R. Offord, Agent

1. Introduction

This report deals with the progress of the chemical eradication of Ribes from January 1, 1926, to the present date. It intends to analyze all data taken from last year's experimental areas at Santa, Idaho, and Wallace, Idaho, and to summarize the more important observations made from those data. It also reports on the field experiments of this year, outlines the proposed scheme of research for the coming winter and presents tentative plans for work of the ensuing field season.

II. Research Work in Europe; and Eastern U. S.

The writer took leave of absence from the Office of Blister Rust Control last December and spent five months in Europe studying chemical methods of weed control and general plant physiology. Particular attention was paid to the physiology of absorption. Work was done at the University of London, the Library of the British Museum, London, England, and at the College de France, Ecole de Pharmacie and Bibliothēque Nationale, Paris, France. Many prominent chemists and experimental agriculturists were met and interviewed.

Work was commenced at Boston, Mass., by the writer on May 10. One month was spent in the Eastern and middle eastern states making arrangements pertinent to the successful organization of the summer's field work. Supplies of a commercial grade of chemicals needed for the field work were purchased from J. C. Wiarda & Co., of New York. The question of power equipment was fully discussed with the U. S. Forest Service and an inspection of their equipment was made. After a demonstration of several different types of spraying apparatus by their respective manufacturers, a four gallon Knap-sack sprayer made by D. B. Smith & Co., of Elmira, N. Y., was decided to be the most satisfactory. Five of these sprayers were purchased. The possibility of the use of collidal $CuCo_3$, $ZnCo_3$, and NaF, was discussed with Dr. Sullivan of the Colloid Equipment Company. Plans were made for the manufacture of these compounds by means of their special colloidal mill. While in Washington, D. C., and the Eastern States several field projects involving the practical application of chemical sprays were investigated. The Gypsy Moth Control Program and the Barberry Eradication work contributed valuable information on power sprayers, and stickers and spreaders of spray solutions. The Japanese Beetle research laboratory at Riverton, N. J., was visited, and after a detailed discussion of our problem with Mr. B. R. Leach, some experiments were made on cultivated red currants using CS_2

as the killing agent. On the westward trip, stops were made at the Universities of Wisconsin and Minnesota, where our scientific problems were discussed with prominent specialists. Demonstrations of power equipment were made by Field Force and Pump Co., Elmira, N. Y., and by Northern Fire Pump Co., Minneapolis, Minn.

III. General Plan of Field Work - 1926

Outlined plans called for a (1) careful checking of all 1925 experimental plots, (2) testing of new killing agents on a small scale, (3) application of the best eradicator on a larger field test. Work was performed over three areas and the time allotted to each was as follows:

June 21-30, Wallace, Idaho. Checking of last year's plots on Lake Creek, respraying NaOH and testing $KClO_3$. Work done by Bell and Offord.

July 1-30, Checking plots on Renfrow Creek, Santa, Idaho, testing of new chemicals and respraying of Atlas N. P., NH_4Cl and NaOH. Work done by Bell, d'Urbal, Smith and Offord.

Aug. 1-Sept. 15, Clarkia, Idaho. Application of $NaClO_3$ and NH_4Cl on a large scale. Study of crew methods and comparative costs. Work done by Bell, d'Urbal, Smith, Platt and Offord.

Since methods of data taking and general crew work at Wallace, Idaho, and Santa, in the main followed procedures used last year, a detailed description of those methods will not be given in this report. Work at Clarkia, Idaho, however, necessitated some modifications and a detailed description of crew work under those new conditions are given in this report.

A. Analysis of 1925 Experimental Plots:

(1) Wallace, Idaho. Three one acre plots were carefully checked and data taken according to the methods fully described in the 1925 report. The following table gives an analysis of the data taken over these plots.

Table No. I.
Wallace, Idaho.

Location of Experiment	Chemical Used	Concentration	Method of application	% Dead Stem 1926	% Bushes Killed 1926	Species and No. Treated	
I.A.(1.0-3.50)	NaF	5%	Spray	11.5	3.4	R. petiolare.	7 clumps Ave. 7'x4'
I.A.(1.0-3.50)	NaF	5%	Spray	11.6	12.8	R. lacustre.	45
I.A.(3.50-3.60)	$HgCl_2$	2%	Spray	5.6	0.0	R. petiolare.	1 clump 33'x10
I.A.(3.50-3.60)	$HgCl_2$	2%	Spray	10.5	0.0	R. lacustre.	15
I.A.(3.60-3.75)	NaBr	10%	Spray	4.2	0.0	R. petiolare.	1 clump 33x5
I.B.(0.0-4.0)	A.N.P.	100%	Spray	91.5	72.1	R. petiolare.	41
I.B.(0.0-4.0)	A.N.P.	100%	Spray	95.5	72.4	R. lacustre.	62
I.B.(4.0-6.60)	A.N.P.	50%	Spray	90.5	65.5	R. petiolare.	47
I.B.(4.0-6.60)	A.N.P.	50%	Spray	95.5	53.0	R. lacustre.	45
I.A.(5.0-6.60)	A.N.P.	50%	Spray	99.8	93.7	R. petiolare.	2 clumps 8'x12" 5'x5'
I.A.(5.0-6.60)	A.N.P.	50%	Spray	79.6	68.8	R. lacustre.	32
II.B.(0.0-6.60)	A.N.P.	50%	Spray	99.6	92.1	R. petiolare.	57
II.B.(0.0-6.60)	A.N.P.	50%	Spray	94.2	51.5	R. lacustre.	177
III.A(0.0-4.50)	$Na_2B_4O_7$	10%	Spray	3.5	0.0	R. petiolare.	2 clumps 40'x20' 50'x35'
III.A(0.0-4.50)	$Na_2B_4O_7$	10%	Spray	11.8	0.0	R. lacustre.	40
III.B(0.0-6.0)	NaBr	10%	Spray	4.3	0.0	R. petiolare.	21
III.B(0.0-6.0)	NaBr	10%	Spray	12.8	0.0	R. lacustre	32

(2) Santa, Idaho. Five one acre plots were checked and data taken by a crew of four men. These data comprised feet of live stem and feet of dead stem of each Ribes, general notes on the effect of each chemical, and a count of the live and dead bushes. Time spent on this work was 348 man hours. The following tables present the analyzed data:

Table No. II.

Santa, Idaho.

	Chemical Used	Concentration %	Method of Application	% Dead Stem 1926	% Bushes Killed 1926	Species and No. Treated	
B	A.N.P.	50	Spray	82.7	43.4	R. lacustre	355
B	A.N.P.	50	Spray	68.7	19.1	G. inermis	144
B	A.N.P.	33 1/3	Spray	69.1	14.1	R. lacustre	424
B	A.N.P.	33 1/3	Spray	37.8	2.8	G. inermis	587
0)B	A.N.P.	50	Spray	42.7	11.2	G. inermis	154
0)B	A.N.P.	20	Spray	62.6	6.1	R. lacustre	25
0)B	A.N.P.	20	Spray	29.5	5.2	G. inermis	145
.60)B	A.N.P.	100	Creek application	100.0	100.0	R. lacustre	8
60)B	A.N.P.	100	Creek application	75.0	66.6	G. inermis	6
)B	A.N.P.	20	Creek application	60.7	50.0	R. lacustre	4
)B	A.N.P.	20	Creek application	59.1	13.2	G. inermis	112
)A	NaOH + NaF	2 and 4	Spray	29.0	0.0	R. lacustre	199
)A	NaOH + NaF	2 and 4	Spray	21.6	1.0	G. inermis	195
)A	NaOH	4	Spray	37.8	11.5	R. lacustre	56
)A	NaOH	4	Spray	30.1	3.5	G. inermis	262
)A	NaOH	4	Spray	76.0	0.0	R. lacustre	143
)A	NaOH	4	Spray	42.5	2.3	G. inermis	260
)A	NaOH	2	Spray	25.0	0.0	R. lacustre	112
)A	NaOH	2	Spray	17.5	1.2	G. inermis	107
)B	NaOH	4	Spray + Soil	31.2	0.0	R. lacustre	4
)B	NaOH	4	Spray + Soil	12.2	0.0	G. inermis	256
)B	NaOH	Solid	Creek application	15.0	0.0	G. inermis	57
0)B	NaOH	5	Liquid + Soil	24.0	0.0	R. lacustre	10
0)B	NaOH	5	Liquid + Soil	17.5	0.0	G. inermis	84
)A	NaF	4	Spray	32.1	0.0	R. lacustre	84
)A	NaF	4	Spray	18.6	1.2	G. inermis	96
)B	NaF	5	Creek application	12.0	0.0	R. lacustre	5
)B	NaF	5	Creek application	21.2	1.0	G. inermis	30
)B	NaF NaOH	5 and 4	Creek application	100.0	100.0	G. inermis	11
0)A	NaBr	8	Spray	14.0	0.0	R. lacustre	9
0)A	NaBr	8	Spray	20.2	1.3	G. inermis	153
0)B	NaBr NaOH	8 and 4	Spray	31.6	0.0	R. lacustre	20
0)B	NaBr NaOH	8 and 4	Spray	21.2	0.0	G. inermis	61
)A	$Na_2B_4O_7$	8	Spray	79 .0	0.0	R. lacustre	43
)A	$Na_2B_4O_7$	8	Spray	32.2	1.0	G. inermis	183
)A	$CaCl_2$	10	Spray	47.2	0.0	R. lacustre	4
)A	$CaCl_2$	10	Spray	10.7	0.0	G. inermis	256
50)A	$CaCl_2$	12	Spray	16.6	2.0	G. inermis	77
)A	$CaCl_2$	10	Creek application	48.0	0.0	R. lacustre	1
)A	$CaCl_2$	10	Creek application	10.4	0.0	G. inermis	95
)A	$CaCl_2$	1/2#-1# per bush solid	Creek application	75.0	12.5	G. inermis	60
00)A	KF	4	Spray	30.0	2.0	G. inermis	91
00)A	KF	4	Spray	35.0	0.0	R. lacustre	1
50)B	KF	4	Creek application	36.0	0.0	G. inermis	22
00)A	NaCl	10	Spray	36.3	0.0	R. lacustre	2
00)A	NaCl	10	Spray	13.1	0.0	G. inermis	95
00)A	NaCl	20	Spray	26.6	0.0	R. lacustre	3
00)A	NaCl	20	Spray	12.2	2.0	G. inermis	51
70)A	NaCl	20	Creek application	19.1	2.0	G. inermis	66
00)B	NaCl	1/2#-[illegible] Solid	Creek application	50.0	50.0	R. lacustre	4
00)B	NaCl	1/2#-3# Solid	Creek application	59.3	51.2	G. inermis	45
.50)A	NH_4Cl	20	Spray	97.8	0.0	R. lacustre	1
50)A	NH_4Cl	20	Spray	39.1	0.0	G. inermis	70
00)A	NH_4Cl	12½	Spray	30.9	0.0	R. lacustre	4
00)A	NH_4Cl	12½	Spray	23.8	1.5	G. inermis	87
00)A	NH_4Cl	12½	Spray	25.0	0.0	G. inermis	75
00)A	NH_4Cl	10	Spray	48.7	0.0	R. lacustre	6
00)A	NH_4Cl	10	Spray	12.4	0.0	G. inermis	177
00)A	NH_4Cl	10	Spray	26.4	2.1	G. inermis	91
00)A	NH_4Cl	5	Spray	25.0	0.0	R. lacustre	1
00)A	NH_4Cl	5	Spray	10.0	0.0	G. inermis	60
50)B	NH_4Cl	1	Spray	11.5	0.0	G. inermis	68
40)B	NH_4Cl	Solid	Creek application	92.0	56.1	G. inermis	9
)A	NH_4Cl	Solid	Creek application	80.0	77.0	G. inermis	17
)A	NH_4Cl + NaOH	Solid	Creek application	55.0	62.1	G. inermis	8
)A	$NH_4Cl + (NH_4)_2 Cr_2O_7$	Solid	Creek application	40.0	20.0	G. inermis	6
50)A	NH_4Br	8	Spray	75.0	0.0	R. lacustre	1
50)A	NH_4Br	8	Spray	19.0	3.3	G. inermis	30
00)B	NH_4Br	2½	Spray	20.0	0.0	G. inermis	113
00)B	NH_4Br	2½	Creek application	17.3	0.0	G. inermis	46
00)B	$(NH_4)_2 Cr_2O_7$	2	Creek application	35.0	0.0	G. inermis	23
00)A	NH_4NO_3	10	Spray	7.2	0.0	G. inermis	45
50)A	NH_4NO_3	5	Spray	10.0	0.0	G. inermis	77
50)A	NH_4NO_3	5	Spray	16.0	0.0	R. lacustre	3
50)B	NH_4NO_3	20	Creek application	11.1	0.0	G. inermis	16
)B	NH_4NO_3	10	Creek application	5.6	0.0	G. inermis	44
50)B	$BACl_2$	20	Spray	20.6	0.0	G. inermis	62
50)B	$BACl_2$	8	Spray	7.9	0.0	G. inermis	32
00)B	$BACl_2$	10	Creek application	3.1	0.0	G. inermis	45
50)B	$CaOCl_2$	Solid	1/2 # - 1 # Creek application	35.0	12.1	G. inermis	62
00)A	$CaOCl_2$	Solid	Dusted	50.0	0.0	R. lacustre	1
00)A	$CaOCl_2$	Solid	Dusted	2.1	0.1	G. inermis	59
00)B	Kerosene	100%	Spray	49.6	14.4	G. inermis	42
00)B	Kerosene	100%	Spray	100.0	100.0	R. lacustre	3
00)B	Kerosene	100%	1/2 pint per bush Creek application	60.0	46.0	G. inermis	13
00)B	Kerosene + Acid Sludge	50% each	1 pint per bush Creek application	90.0	92.1	G. inermis	12
50)B	Acid Sludge + H_2O	50% each	1 pint per bush	85.0	65.0	G. inermis	7
00)B	Acid Sludge + H_2O	50% each	1 pint per bush	75.0	60.0	G. inermis	10

(3) General observations. Atlas N. P. - Concentration of 50% most effective as a spray. Ribes more resistent than nearby brush which for the most part has been killed. Vitality of Ribes very low. Sprouting has taken place from crowns. Effectiveness of this chemical decreases below a concentration of 50%. It is equally effective when used as a crown application concentration of 100%. *R. petiolare* is most susceptible and *G. inermis* least so. It is best applied early in the warm dry season. Chemical has excellent possibilities as an eradicator.

NaF. - No apparent effect when applied either as a spray or a creek application. Production of fruit this year seemed to be less than that of last year.

NaOH + NaF - Considerable lowering of vitality of plants. Very little growth has been made during 1926 season. Where plant has been killed back to crown the growth of sucker has been vigorous. Most effective when applied in liquid form around crown. *R. lacustre* and *G. inermis* equally susceptible. Ineffective as a spray but a good eradicator when used about the crown of the plant.

NaOH. - Highly caustic and rapid in its action. One spraying has no permanent deleterious effect. Two applications cause general lowering of vitality with death of small number of bushes and considerable stem killed. *R. lacustre* more susceptible than *G. inermis*. Applied as a crown application it is relatively non-effective. A concentration of 8-10% would be very toxic but extremely difficult to handle under field conditions.

NaBr. - Bushes appear vigorous. This chemical has killed a percentage of live stem but remaining portions of bush are flourishing. Action is somewhat more apparent on *G. inermis* than on *R. lacustre*.

NaBr + NaOH - When used in alkaline solution it is more effective. Does not seem to be a good killing agent.

$HgCl_2$ - Very caustic and rapid in its action. No permanent effect on bushes. Growth this spring was vigorous.

$Na_2B_4O_7$ - Ineffective both as a spray and as a crown application. Very little defoliation last year and the bushes quite vigorous this spring.

$CaCl_2$ - Most effective when applied to crown of plant in solid form 1/2# - 1# per bush. *G. inermis* more resistant than *R. lacustre* to the spray. Leaves of *G. inermis* were small and spotted the spring following treatment. Bushes vigorous for the most part. Possibilities as a crown application only.

KF - Equally effective when used both as a crown application or a spray. Bushes were obviously suppressed by treatment. *R. lacustre* and *G. inermis* equally resistant. This chemical might be quite effective

in concentration of 10%.

NaCl - Relatively ineffective when used as a spray. When used in solid form about the roots of the plants it gave a fair percentage of kill. The quantities of this chemical necessary to eradicate a large number of bushes would render its use impracticable. R. lacustre and G. inermis equally resistant.

NH_4Cl - Good possibilities as a killing agent. It has the same slow action on Ribes as the chlorates. Bushes that were sprayed last year are considerably suppressed although few have been killed outright. Crown application was quite effective. This chemical should be applied early in the growing season.

$(NH_4)_2Cr_2O_7$. - Used only as a crown application on G. inermis. It gave a percentage of complete kills and lowered the vitality of the bushes treated. Chemical is expensive.

NH_4Br - Not very toxic when applied either as a spray or crown application. Might be more effective if used in greater concentration than 8%. G. inermis much more resistant than R. lacustre.

NH_4NO_3 - Small amount of live stem killed. Chemical is relatively non-toxic. R. lacustre and G. inermis equally resistant.

$BaCl_2$ - No apparent loss of vigor on part of the bushes. Applied to G. inermis only.

$CaOCl_2$ - Applied in solid form as a crown application it gave a percentage of complete kills. Plants were somewhat suppressed when dusted over the bushes; it killed only a nominal percentage of live stem. Did not seriously impair the vigor of the plants.

Kerosene - Fairly effective when used as a crown application. It also gave a number of kills when sprayed on the bushes. Kerosene has possibilities as a killing agent.

Acid sludge - Used only as a crown application. Difficulty in handling this substance renders its use on a large scale impracticable. The material is quite cheap and gave a fair percentage of kill.

B. Experimental Work - 1926.

(1) Wallace, Idaho. Several stations over our Wallace plots were left unsprayed last year owing to the unexpected termination of the work. These areas were treated this year with NaOH and $KClO_3$. Data relative to each separate experiment are presented in a form somewhat similar to that used in last year's report as follows:

1. Location data.
2. Number of each species of Ribes.
3. Date of application, amount of chemical used and method of application.
4. Chemical used and concentration.
5. Weather.
6. Remarks.

Plot I. - (3.50-3.60)A (Eastern side of cedar tree).

1. R. petiolare 1 clump 15x5.
2. June 28, A.M. 6 gallons spray.
3. $KClO_3$-10% + NaOH - 2%.
4. Fine, warm; cloudy in P.M.
5. Spray spreads well but does not stick.
   Action of chemical fairly rapid. Defoliation 100%.

Plot I. - (3.50-3.60)A (Western side of cedar tree).

1. R. petiolare 1 clump 15x5.
2. June 28, A.M. 3 gallons spray.
3. $KClO_3$ - 10%.
4. Fine, warm, cloudy in P. M.
5. Linseed oil 1% used as sticker and spreader.
   It increased the spray efficiency very well.
   Action of chemical slow. Defoliation 100%.

Plot I. - (4-5)A

1. R. petiolare 42. R. lacustre 12.
2. June 29, A.M. 6 gallons. P.M. 6 gallons spray.
3. $KClO_3$ - 10%.
4. Fine, hot, slightly cloudy in A.M.
5. Action of chemical slow. Defoliation 100%.

Plot II. - (0-1)A.

1. R. petiolare 2 clumps, 4'x5', 2x4.
2. June 28, A.M. 7½ gallons crown application.
3. $KClO_3$ - 15%.
4. Fine, warm, cloudy.
5. No apparent effect when inspected on 8/12/26.

Plot II. - (0-1)A.

1. R. petiolare 1 clump 4'x6.
2. June 29, P.M. 5 gallons creek application.
3. $KClO_3$ - 12% + NaOH - 2%.
4. Cloudy and sultry.
5. No immediate effect.

W128.
Typical growth of G. inermis at Santa, Idaho.

W131.
Typical conditions at
Santa, Idaho.

W89.
Crew work, Santa, Idaho. Note G. inermis in foreground.

W188.
G. inermis and R. lacustre killed by Atlas N. P.

Plot II. - (1-2)A.

1. *R.* *petiolare*, 1 clump 4x4. *R.* *lacustre* 3.
2. June 30, A.M. 5 gallons Creek application.
3. $KClO_3$ - 12% + NaOH - 3%.
4. Cloudy and warm.
5. No immediate effect.

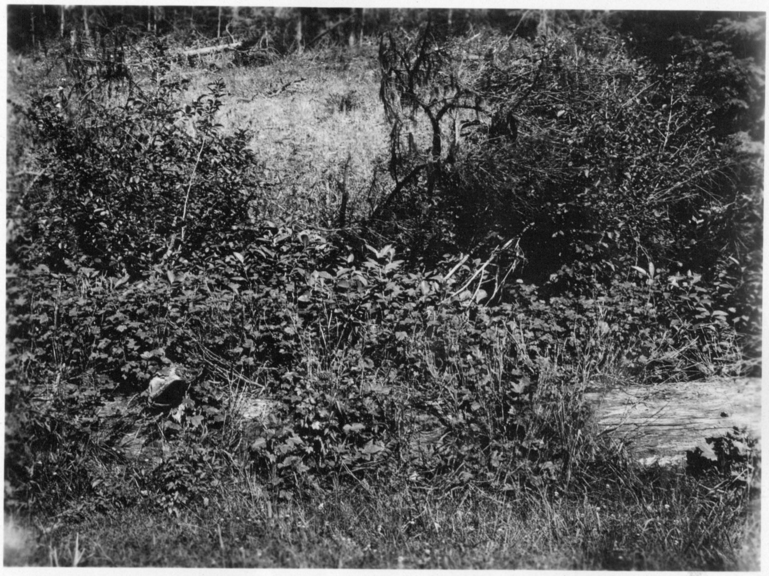
Plot III. (0-1)A.

1. *R.* *petiolare*. 1 clump 40x20. *R.* *lacustre* 10.
2. June 26, P.M. 9 gallons spray.
3. NaOH - 5%.
4. Fine, warm, cold nights with heavy dews in early A. M.
5. Rapid and complete defoliation.

Plot III. (1-2)A.

1. *R.* *petiolare*. 1 clump 20x10. *R.* *lacustre* 12.
2. June 25, P.M. 6½ gallons.
3. NaOH - 5%.
4. Fine and warm. Heavy dews in early A.M..
5. Rapid and complete defoliation.

(2) Santa, Idaho. One new area, Plot VI, was staked out the same size as the five plots laid out in 1925. Spraying data as well as Ribes data are given in tabular form. The scheme used last year in the marking and lettering of stakes was adhered to throughout. For purposes of clarity 1926 experimental stations have been lettered in green in place of the black used for 1925 work. Eight experimental areas were located along Renfrow Creek, in a stream type which contained *R.* *petiolare* and *G.* *inermis* mixed with Salix, Alnus and Craetegus. Several of last year's experiments were repeated in order to determine the efficacy of the chemical when applied twice over the same area. Chemicals tested in this manner were A.N.P., NH_4Cl, NaOH. A graphic plan of Plot VI, and the experimental detail of all work performed at Santa is given below. Results of these experiments shall be determined next spring after they have been carefully checked over and data worked up following the scheme used for 1925 plots.



W9.
R. petiolare growing on Renfrew
Creek, Santa, Idaho.

Plot VI. (5-6)B.

1. R. petiolare 8, R. lacustre 210, G. inermis 122.
2. July 23, A.M. 12 gals. spray.
3. R.B. II. 9%.
4. Ca. Cas. used as sticker. Action of chemical slow. Very little defoliation.

Plot VI. (6.0-6.6)B.

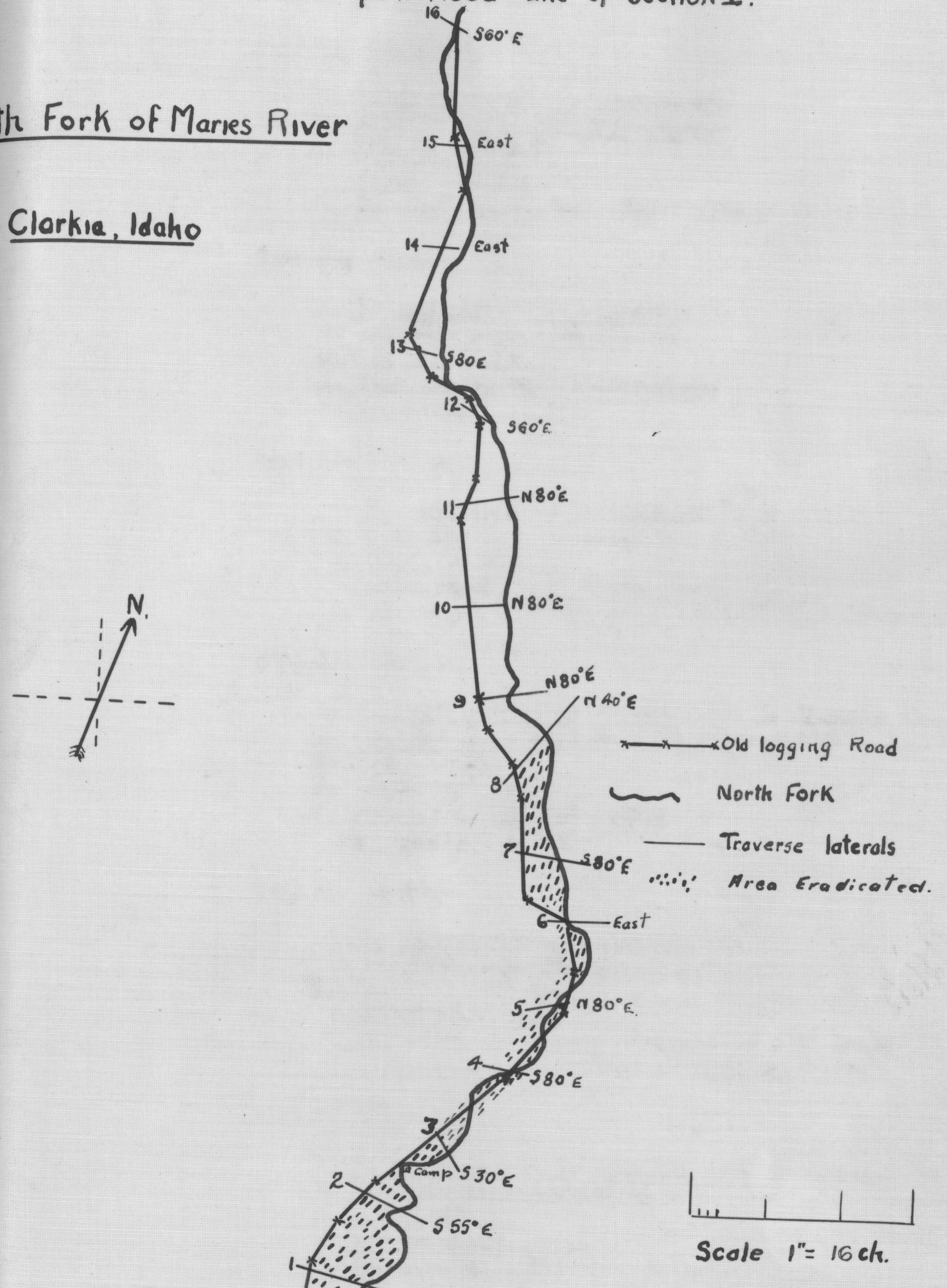
1. R. petiolare 1, R. lacustre 92, G. inermis 60.
2. July 22, P.M. 4 gals. spray.
3. Via Rasa - 6%.
4. Air is smoky, warm.
5. No apparent effect.

(3) Clarkia, Idaho - Description of the Area:

Work was commenced on the new area at Clarkia, Idaho, August 2nd. This area is flat-bottom stream type which has a brush covering of Salix, Alnus, Cornus and Crataegus. G. inermis grows in heavy concentration in the dense brush, while R. petiolare is found along the creek and in moist and more open spots. R. lacustre occurs at the base of the rocky outcrops on the lower hill slope of the drainage and with G. inermis in the bottom land. R. viscosissimum grows on both northern and southern slopes of the drainage. The area represents a good white pine site.

Mapping the Area and Data Taking: The North Fork of the St. Maries River was traversed and mapped. Lateral strips were run by compass line every eighth of a mile over two miles of the creek length. (See map) Ribes data were taken by two men along each lateral according to our old scheme, viz, feet of live stem, feet of dead stem and number of bushes. The width of the strip was 1/4 chain. On every other lateral a milacre plot was staked out in an area which was considered to be most representative of that block and Ribes data taken over the plot. The average figures obtained on the Ribes as a result of these two checks have been applied over the respective areas of each block. A block represents the area between two lateral strips and bounded by the logging road on one side and the main creek on the other (see Map.) These blocks are numbered I, II, III, and so on up to XVI. Table I gives the Ribes data for the sixteen blocks.

160 Chains from Road-End of Section-I.



Plot VI. (6.0-6.6)A.

1. R. lacustre 64, G. inermis 83.
2. July 22, A.M. 10½ gals. spray.
3. $(NH_4)_2CO_3$ - 20%
4. Cloudy and cool.
5. Ca. Cas. as sticker. Fair. Partial defoliation.

Plot VI. (O-1)B.

1. R. lacustre, 10. G. inermis 7.
2. July 21, A.M. 1 gal. spray.
3. Via Rasa - 8%.
4. Fine, warm, very little wind.
5. No apparent effect.

Plot VI. (1-2)B.

1. R. petiolare 1, R. lacustre 8, G. inermis 49.
2. July 22, A.M. 1½ gals. spray.
3. NH_4Cl - 25%.
4. Fine, warm, very little wind.
5. Action of chemical slow. Defoliation 100%.

Plot VI. (2-3)B.

1. R. petiolare 5, R. lacustre 66, G. inermis 84.
2. July 22, P.M. July 23 - 5½ gals. spray.
3. R.B.I. - 8%.
4. Cloudy and cool.
5. Spreads and sticks very well.
   No apparent effect.

Plot VI. (3-4)B.

1. R. lacustre 43, G. inermis 94.
2. July 22, P.M. 5½ gals. spray.
3. R.B. II. 8%.
4. Cloudy and cool.
5. Shows up white on foliage. Sticks to leaves extremely well. Action of chemical slow.

Plot VI. (4-5)B.

1. R. petiolare 1, R. lacustre 140, G. inermis 96.
2. July 23, A.M. 6 gals. spray.
3. R.B.I. 4%.
4. Air is smoky, warm.
5. Ca. Cas. as a sticker. Fair.

Santa, Idaho.

Plot VI. (0-1)A.

1. *R. petiolare* 1, *R. lacustre* 12, *G. inermis* 13.
2. July 21, 2 gals. spray.
3. R.B.I. 8%.
4.
5.

Plot VI. (1-2)A.

1. *R. lacustre* 9, *G. inermis* 70.
2. July 21, A.M. 3 gals. spray.
3. NH_4F - 4%.
4. Fine, warm, very little wind.
5. Flour 1% used as sticker. Not extremely effective. Defoliation 100%.

Plot VI. (2-3)A.

1. *R. petiolare* 9, *R. lacustre* 143, *G. inermis* 164.
2. July 20, P.M. 17 gals. spray.
3. NH_4Cl - 25%.
4. Fair, cloudy at intervals.
5. Flour 2% used as sticker. Fair. Defoliation 100%.

Plot VI. (3-4)A.

1. *R. lacustre* 119, *G. inermis* 225.
2. July 21, P.M. 8½ gals. spray.
3. $(NH_4)_2CO_3$ - 20%.
4. Fine, warm, little wind.
5. Flour 1% as a sticker.

Plot VI. (4-5)A.

1. *R. lacustre* 130, *G. inermis* 96.
2. July 21, P.M. 8¾ gals spray.
3. $(NH_4)_2CO_3$ - 15%.
4. Fine, warm, little wind.
5. No apparent effect.

Plot VI. (5-6)A.

1. *R. petiolare* 3, *R. lacustre* 96, *G. inermis* 177.
2. July 22, A.M. 13 gals. spray.
3. NH_4F 10%.
4. Cloudy and cool.
5. Calcium caseinate, as a sticker. Fair. Defoliation 100%.

Table No. III.
Plot VI.

	A	B
6.6	$(NH_4)_2CO_3$ 20% $10\frac{1}{2}$ gals. sp. + Ca. Cas. 7/22/26	Via Rasa 6% 4 gals. sp. 7/22/26
6	NH_4F 10% 13 gals. sp. + Ca. Cas. 7/22/26	R.B.II. 4% 12 gals. sp. + Ca. Cas. 7/23/26
5	$(NH_4)_2CO_3$ 15% $8\frac{3}{4}$ gals. sp. 7/21/26	R.B. I. 4% 6 gals. sp. + Ca. Cas. 7/23/26
4	$(NH_4)_2CO_3$ 20% $8\frac{1}{2}$ gals. sp. + Flour 7/21/26	R.B.II. 8% $5\frac{1}{2}$ gals. sp. 7/22/26
3	NH_4Cl 25% 17 gals. sp. + flour 7/20/26	R. B. I. 8% $5\frac{1}{2}$ gals. sp. 7/22-23/26
2	NH_4F 4% 3 gals. sp. + flour 7/21/26	NH_4Cl 25% $1\frac{1}{2}$ gals. sp. 7/22/26
1	R.B. I. 8% 2 gals. sp. 7/21/26	Via Rasa 8% 1 gal. sp. 7/21/26
0		

"Via Rasa" - Mixture of Na and Ca. Para Toluene Sulphonamide.

R.B.I. - Na Para Toluene Sulphonamide.

R.B.II. - Ca. Para Toluene Sulphonamide.

Ca. Cas. - Calcium Caseinate.

W192.
Brush conditions on the North Fork,
Clarkia, Idaho.

W180-W181.
Crew work with compressed air sprayers-
Santa, Idaho.

Table IV. groups together the experiments that have been made to note the comparative effects of one, two and three applications of a chemical.

Table No. IV.

Location	Chemical	Concentration	Quantity Used in Gals.	Method
Plot I (1-2)A	NaOH	4%	12	Sprayed(3)*
Plot I (2-3)A	NaOH	4%	$7\frac{1}{2}$	Sprayed (2)
Plot I (0-1)B	A.N.P.	50%	9	Sprayed (2)
Plot III (2-3)B	A.N.P.	50%	9	Sprayed (2)
Plot I (2-3)B	A.N.P.	33 1/3%	$7\frac{1}{2}$	Sprayed (2)
Plot III (0-1)B	A.N.P.	20%	4	Sprayed (2)
Plot II (4-5)A	NH_4Cl	20%	7	Sprayed (2)
Plot III(0-1.5)A	NH_4Cl	20%	17	Sprayed (2)
Plot V (2-3)B	NH_4F	4%	6	Sprayed (2)
Plot III (2-3)B	Stripped leaves off by hand for the 2nd time.**			

* Showed considerable dead stem (40%) and lowering of vitality of plant.
** No apparent effect.

In addition to the above areas resprayed the following experimental areas were laid out in the swampy brush type of Renfrow Creek.

Table No. V.

Number and Area	Chemical	Concentration	Quantity Used in Gals.	Method
X-I (69'x33')	Kerosene	100%	10 gals.	Sprayed
X-II (66'x16½")	R. B. I.	8%	10½ gals.	Sprayed
X-III (66'x16½')	R.B. II.	8%	6 gals.	Sprayed
X-IV (12'x20')	R.B. II.	8%	3 gals.	Sprayed on Stems alone
X-V (35'x10')	A.N.P.	50%	4 gals.	Sprayed
X-VI (66' x 16½')	Via Rasa	4%	6 gals.	Sprayed
X-VII(66' x 16½')	NH_4F	5%	6 gals.	Sprayed
X-VIII (66' x 33')	NH_4F	5%	6 gals.	Sprayed

N.B. - (1) Stakes marking the area and boundaries of 1926 plots are painted white and lettered in green. Black letters designate 1925 plots.

(2) Crown applications of the new chemicals were made on individual bushes marked with a small cedar stake.

Table No. VI.

Block Number	No. of Bushes per Acre			Ft. of Live Stem per Acre			Ft. of Dead Stem per Acre		
	R. petiolare	R. lacustre	G. inermis	R. petiolare	R. lacustre	G. inermis	R. petiolare	R. lacustre	G. inermis
I	94	73	313	3356	2460	3900	105	115	440
II	258	231	240	82240	13250	43400	8060	3980	4475
III	220	360	200	135520	18800	27540	59320	-	6140
IV	584	86	140	200215	8320	18900	19400	-	1270
V	1008	43	81	27800	292	1105	2560	-	-
VI	300	50	312	78250	1430	54900	8600	-	8750
VII	346	226	612	68400	18340	75650	10500	2270	18100
VIII	343	163	343	91950	3140	28500	15700	310	4240
IX	72	309	10	35200	8770	105	17100	2220	-
X	273	464	-	49450	10020	-	630	126	-
XI	480	100	-	265310	3700	-	50580	-	-
XII	507	292	78	113550	30070	17550	20200	5275	2440
XIII	120	200	-	62600	20880	-	4000	2000	-
XIV	416	416	-	27950	29760	-	6740	960	-
XV	160	40	-	208120	8000	-	44000	2000	-
XVI	40	160	-	4000	9400	-	2000	400	-
Average per A. Over Area	326	201	138	78,276	12,352	17,590	16,843	1,227	2,897

W196.
General view of area worked, North Fork, Clarkia, Idaho.

W195.
R. petiolare and G. inermis pulled from 1/10 acre, Clarkia, Idaho.

Method of Working Area: Each block was marked out into 24 foot strips by means of string lines running parallel to the original laterals, except where the creek came within 24 feet of the road; in this event the strip was laid parallel to the stream. A crew of four men sprayed this 24 foot strip, working up one strip and back on the next. The spraying crew was managed by the assistant foreman, while the foreman marked out strips, made up solutions and kept up the supplies of chemicals. The crew worked so that the line of sprayed bushes was always behind them. This was necessitated by the concentration of Ribes, in order to avoid shaking off the chemical after it had been sprayed. Two types of sprayers were used (1) a three gallon compressed air sprayer, (2) a four gallon knap-sack sprayer. The former seemed more satisfactory over the more open ground, while the latter was preferable in the denser brush.

Summary of Work Done at Clarkia, Idaho: Six chemicals were used in the experimental work over a total of 14.62 acres. The average cost was $27.41 per acre. Full details of the work are given in Table VIII, under cost analysis. Particular attention was paid to methods of crew work, and two types of apparatus were used under the varying conditions encountered over the entire area. This phase of the work is discussed at some length under spray efficiency and crew management in this report. A number of different stickers and spreaders were tested in combination with the sprays used. Inflammability tests on sodium chlorate and on mixtures of sodium chlorate and calcium chloride were tried out. After a period of from six to seven days of fine hot weather following the application of $NaClO_3$ the only fire hazard constituted is that of any very dry material, that is to say, after that time the chemical itself does not entail a risk. The addition of calcium chloride to the chlorate spray cuts down the explosive violence of the chlorate but does not entirely destroy its inflammable nature.

R. petiolare fruit sprayed with the various chemicals as well as fruit from unsprayed bushes were collected. It is planned to carry out germination tests at the University of California this winter in order to determine the effect of chemicals upon the fertility of _R. petiolare_ seed.

Reference to the map of the Clarkia area shows the location of the work and the progress made.

V. Cost Analysis

The following section of the report presents an analysis of the costs of the field project for the season 1926. A summary of the acreage and cost of eradication over the Clarkia area as well as comparative figures on chemical vs. hand eradication are also given. In closing this discussion it might be of interest to compare the average cost of $59.10 per adre for the work done in 1925 with that of $27.41 per acre for eradication in 1926. It must also be kept in mind that the eradication of one acre of Ribes of this concentration from the stream bottom means the protection of some 30 to 40 acres of white pine on the neighboring hillside where the concentration of Ribes is very small. On a water-shed basis this brings the cost per acre of pine protected well within practical limits.

Total cost of Chemical Eradication Field Project

June 1 to September 15.

Payroll	$1157.26
Subsistence	512.05
Chemicals	279.13
Transportation of Men	173.79
Equipment	45.65
Transportation of Equipment	8.39
Transportation of Chemicals	132.67
Miscellaneous	12.50
Total Cost of Project . .	$2321.44
Less Total Cost of Chemicals .	411.80
Total Labor Cost	$1909.64
Time in man hours spent on project	2574
Labor Cost per man spraying hour	$ 0.742

On August 22, a representative strip (4.5 x .36) sq. chains of the Clarkia area was first sprayed and then hand eradicated to determine the relative costs. The tables given below show the results obtained and are given on an acreage basis.

Table No. VII.

Chemical Eradication

Walking Time on Job	Preparation of Chemical	Walking and Finding	Spraying Time	Gals. Used	Chemical Cost per Acre	Labor Cost per Acre	Total Cost per Acre
65 m.m.	278 m. m.	277.5m.m	925 m.m	77.2	15.15	11.08	26.23

Table No. VIII.

Hand Eradication

Walking Time to Job	Walking and Finding	Pulling Time	Labor Cost per acre.
65 m. m.	185 m. m.	3490 m. m.	$41.80

Table No. IX.

Eradication Costs - Clarkia, Idaho

Chemical	Total Ribes Live stem per acre	Block No.	Acre-age	Man Spraying Hours		Gallons of Chemical		Chemical Cost		Labor Cost		Total Cost	
				per Acre	per 1000' Live stem	per Acre	per 1000' Live Stem	per Acre	per 1000' Live Stem	per Acre	per 1000' Live stem	per Acre	per 1000' L. Stem
NH_4F - 4%	9,716	I	3.80	7.02	0.72	16.3	1.63	1.15	0.12	5.19	0.53	6.34	0.65
NH_4Cl - 20%	9,716	I	1.21	17.34	1.73	48.5	4.85	8.40	0.86	12.83	1.28	21.23	2.14
$KClO_3$ - 4%	138,890	II	1.40	47.57	0.34	160.0	1.15	5.20	0.03	35.29	0.25	40.49	0.28
$NaClO_3$ - 25%	181,860	III	1.70	22.26	0.12	110.0	0.65	21.40	0.11	16.47	0.09	37.87	0.20
$(NH_4)_2CO_3$ - 20%	227,435	IV	.78	23.84	0.11	104.0	0.45	19.10	0.08	17.64	0.08	36.74	0.16
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	29,197	V	1.16	12.13	0.42	72.3	2.48	17.54	0.60	8.98	0.31	26.52	0.91
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	134,580	VI	2.59	12.81	0.10	67.8	0.51	15.42	0.114	9.48	0.07	24.90	0.18
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	162,390	VII	1.98	13.52	0.09	80.7	0.50	18.38	0.113	9.90	0.07	28.28	0.18

Explanatory Notes on Table No. IX. (Cont'd).

Block No.	Percentage L. S. of Ribes Species			Remarks
	R. petiolare	R. lacustre	G. inermis	
I	33.4	33.3	33.3	Total L.S. should have been 40,000 ft. The area was cut up by grass land making estimates applied on the area too low.
II	70	10	20	Conditions on II. and III. were uniform. Reference to Table No. IX. shows that costs are in good agreement.
III	70	10	20	
IV	89.4	3.5	7.1	This area was more open R. petiolare in more open location without brush covering.
V	69.2	7.7	23.1	Area was cut up by windings of main stream and several back-washes of stream. L. S. estimate should be 100,000.
VI	50	10	40	Uniform conditions on VI. and VII. Ribes species in same proportion also give good agreement on cost figures.
VII	40	10	50	

VI. Relative to:

A. Spray Efficiency.

At this point it might be of interest to review the factors which seem to constitute the total effectiveness of a spray. For the sake of brevity they are presented here in tabular form.

1. Uncontrollable factors.

   (a) Weather.
      (1) Heavy dews cause a dilution and wastage of chemical.
      (2) Rain shortly after application with a resulting loss of chemical.
      (3) High wind at timé of application, causing too vigorous shaking of bushes.
      (4) High relative humidity tending to slow down the process of absorption, if this condition has prevailed for a few days previous to spraying.

   (b) Screening effect of nearby foliage.
   (c) Physical structure of the leaf.
      (1) Glabrous or non glabrous.
      (2) Smooth or sticky surface.
      (3) Manner in which the leaf hangs from the bush.
      (4) Drooping.
      (5) Straight or at right angles to stem.
      (6) Erect and somewhat cup shaped.

   (d) Loss of chemical through stock grazing.

2. Controllable factors.

   (a) Careful and efficient work on the part of the crew.
   (b) Good mechanical equipment. The apparatus should provide-
      (1) Fine, misty spray. (Too fine a spray is not desirable since the loss of spray due to evaporation is quite appreciable on a warm windy day.

   (c) Mechanical spreading and sticking of the spray.
      (1) This is obtained with a good air pressure type of sprayer having a vermorel nozzle. Sufficient velocity of the liquid is necessary so that the spray will "flatten out" when it hits the leaf.

(d) Use of chemical spreaders.

(1) To spread well a spray should have a low surface tension between itself and the solid sprayed. If the spray does not spread well a substance should be added that will reduce the surface tension of the solution.

The following substances have been tested during the last field season as stickers and spreaders: (1) Linseed oil, (2) Flour, (3) Soap, (4) Calcium Caseinate, (5) glue, (6) Sunoco-self-emulsifying oil, (7) fish oil soap. Field observations on the efficacy of these spreaders would indicate the following:

Linseed oil - Good if used with neutral electrolytes of low concentration.

Flour - Fair for acid, neutral or alkaline solutions.

Soap - Fair if used with amphoteric electrolytes.

Calcium Caseinate - Good when used as spreader for NH_4Cl spray.

Glue - Good with any concentration of electrolyte whether acid, alkaline or neutral. Effective with $NaClO_3$ spray.

Sunoco oil - Fair, when used with electrolytes of low concentration.

Fish oil soap - Good with any concentration of electrolytes whether acid, neutral or alkaline.

The ideal time for wet spraying seems to be early in the growing season. At the time of application dull weather is probably better than hot dry weather if the humidity is low. If the sun is too hot immediately after application a certain amount of the chemical will dry on the leaf and drop off before it has a chance to penetrate, particularly so if a high wind prevails. A period of hot, dry weather a few days after application and a slight fall of dew in the early morning provides ideal conditions.

B. Crew Management.

We may consider this phase of the work in the final analysis to be the practical application of the chemical under field conditions. When we seek to eradicate Ribes by means of chemicals we must face not only the ordinary problems of crew management but the additional task of providing these men with a continuous supply of chemical. As a result, our methods will have to be more elastic than those of hand eradication if we are to handle the exigencies of our work. The work performed to date has been carried on by a crew of five men. A three gallon compressed air sprayer (Albert Lea Sprayer Co., Albert Lea, Minn.) and a four gallon knap-sack sprayer (D.B. Smith Co., Utica, N. Y.) have been used by the crew in its work. Although we do not intend to use this small hand type of equipment on a large scale, yet there will doubtless be areas or portions of areas that can be more economically eradicated by this method. For that reason it is advisable to briefly review the experience that we have had with this type of equipment.

1. Chemical supplies: Chemicals were purchased in barrel lots, freighted to the nearest railway station and then hauled out to the job by auto truck. Spray solutions were prepared at base camp and charged at once into the individual sprayers. A twelve-gallon copper boiler was found to be the most convenient type of container for mixing solutions. Each crewman had a particular job assigned to him, i.e., measuring out water, stirring the solution, filling the sprayers. The foreman saw that the proper amounts of ingredients were used and kept his notes apace of all operations. When the crew had worked the area adjacent to the camp it was found more convenient to carry a supply of chemicals out of camp and make up the solutions on the ground. The proper weight of dry chemical was placed in a small flour sack and securely tied. The foreman then carried several of these charges of chemical in a pack sack sufficient for the morning's work or the job on hand.

2. Working the ground. The area worked was at Clarkia, Idaho, previously described. String was used to mark the boundaries of working strips and proved quite satisfactory. The crewmen worked four abreast at a distance of six feet from one another. It was found undesirable to have a foreman check behind the crew in heavily concentrated Ribes areas since he knocked off a considerable portion of the spray from the bushes. The foreman was responsible for the supply of chemical and laid out the work in advance of the crew. One of the crewmen designated as assistant foreman looked after line formation and managed the crew in the absence of the foreman. The men worked so that the line of sprayed bushes was always behind them. When large individual clumps of bushes were sprayed the men always worked from the centre toward the outer fringe. The men were instructed to look after all clumps of bushes on their own line to avoid "doubling up" on the application of spray. This was done unless the concentration was too high in which case the next man would swing from his line and assist.

Test strips were run using the two different types of apparatus over the same ground and the actual spraying time taken. The number of gallons of chemical used was also measured. The comparative figures are given in tabular form.

Table No. X.

Relative Efficiency of Two Types of Sprayers

Strip No.	Gals. Used Knap-Sack	Gals. Used Compressed Air	Spraying Time Knap-sack	Spraying Time Compressed Air	Remarks
1	$10\frac{1}{4}$	11	85 m. m.	124 m. m.	thick brush over Area
2	$6\frac{1}{4}$	$7\frac{1}{4}$	59 m.m.	72 m. m.	Thick brush over Area
3	10	7	80 m.m.	84 m. m.	More open Area
4	9	$7\frac{1}{2}$	80 m.m.	80 m. m.	More open Area
5	$17\frac{3}{4}$	14	149 m.m.	132 m. m.	More open Area *

* Extension used on compressed air sprayer.

The above figures as well as the general opinions of the crew-men would show that the knap-sack style of sprayer was easier to handle in the thick brush. Where the going was more open the compressed air sprayer, particularly when fitted with a $1\frac{1}{2}$ ft. extension rod seemed to have advantages. This latter type also involves less labor on the part of the men since it is necessary to continually pump the former in order to deliver the spray.

Although the use of power equipment will completely modify the handling of the men, nevertheless, we shall always find locations where it will be more practical to use this scheme. A combination of power and hand equipment offers the most likely solution of the difficulties met under varied field conditions.

VII. General Summary of Results

Experiments on the chemical eradication of wild currants and gooseberries (Ribes) were commenced June 1924. Possible killing agents were selected from the following (a) soluble inorganic salts, (b) oxidizing acids (c) bases (d) organic acids (e) oils. The results of three years of field experiments 1924, 1925, 1926, would indicate that a suitable killing agent can be found in (a) above. One of the most valuable results of these field experiments has been to point out the possible channels by which an intelligent understanding of our problem might be reached if the necessary research work were undertaken. The following observations and results have been made from field data:

1. From present data spraying seems to be the best means of attack and the only one capable of general application.

II. Ribes can be killed by a single spraying with a soluble inorganic salt.
   a. Best results have been obtained with $NaClO_3$ - 25%.
   b. NH_4Cl - 20%, NH_4F - 4%, $KClO_3$ - 4% also act in a similar manner to $NaClO_3$.

III. Absorption seems to take place, since the roots and crowns have been killed after spraying of the aerial portions.

IV. The different species of Ribes show a range of susceptibility

to different chemicals and even to different concentrations of the same chemical.

V. Three defoliations by means of NaOH - 4% does not kill an appreciable percentage of bushes.

VI. Best results are obtained by spraying during warm dry weather.

VII. Fish oil soap 0.1% by weight of $NaClO_3$ - 25% spray is the best sticker and spreader. Calcium Caseinate 1.0% by weight is the best spreader for NH_4Cl - 20%.

VIII. $NaClO_3$ - 25% spray after drying on the foliage is highly inflammable. This property is lessened though not entirely destroyed by addition of $CaCl_2$ - 25% by weight.

IX. Chemicals of a highly caustic nature (NaOH) or highly toxic and corrosive nature (H_gCl_z) are not desirable, since they cause rapid defoliation and have no permanent effect on Ribes. Bushes are completely releafed two weeks after treatment with a chemical of this nature. Complete kills have been obtained only with chemicals of "subtle toxic" or slow poisonous nature e. g. ($NaClO_3$ - NH_4Cl).

X. Salix and Alnus have been completely defoliated and smaller bushes killed when <u>lower stems</u> only were sprayed with $NaClO_3$.

These observations indicate that the basic problem is that of absorption of the chemical in such a concentration that immediate death does not result; rather a disturbance of the physiological equilibrium of the plant and a resultant sickening over a longer period that finally proves fatal.

Basic Problems to be Answered by This Investigation

1. What measures the toxicity of a chemical or how can we establish a convenient "measuring stick" to express the toxic effect of a chemical on Ribes?

II. Do we actually obtain absorption of the chemical through the leaves and stems?

III. If so under what conditions and what factors influence absorption and consequent death? Concentration of solution? Kind of ion? Temperature? Sunlight? Physiological state of the plant itself?

VIII. Proposed Future Work

A. Laboratory Work

At the close of the field season, the writer was transferred to Berkeley, California, where cooperative arrangements were made with the Divisions of Forestry and of Plant Nutrition for laboratory and greenhouse space wherein to carry on investigational work. The following memorandum addressed to Dr. D. R. Hoaglund, Head of the Division of Plant Nutrition, explains the purpose and nature of the proposed work. Part of this memo-

randum is omitted, as it dealt only with a summary of the previous work.

B. Greenhouse Work - Preparation of Material.

1. a. Ribes farm on campus.
   b. Potted plants under greenhouse conditions.

   These plants to be grown from roots and crowns of Ribes brought in from field.

2. Experiments on the fertility of Ribes seed that have been sprayed with $NaClO_3$ and NH_4Cl.

C. Organization of Laboratory Work.

1. Study the absorption of a series of soluble inorganic salts, e.g. NaF, NaCl, NaBr, NaI.
   Kf, KCl, KBr, KI.
   Does the increasing elector-positive nature of the cation increase or decrease the ease of absorption of the anion and vice-versa?
   Using dilute solutions of the above chemicals measure the electrical conductivity of electrolyte to determine the amount absorbed.

2. Trace the course of some chemical through the plant system - either by microscopic examination of stained plant sections or by spectroscopic detection of a salt (lithium chloride).

3. Test the absorption of $NaClO_3$ varying the factors.
   (1) Concentration.
   (2) Temperature.
   (3) Light of different wave lengths.
   (4) Application of chemicals to leaves and stems, stems, upper surface of leaf, lower surface of leaf, entire leaf.

   Cover parts of plant with oiled paper and spray or apply chemical by means of a small brush.

4. Compare the absorption of KBr (relatively non-toxic) with that of $KBrO_3$ (toxic). Qualitative examination of different portions of the plant to determine the amount of bromine present. Such experiments to be carried on under varying conditions of temperature, light and moisture.

The following points should also be included in our studies if we are to make a complete investigation of the problem. Some of these problems are specific problems that have arisen in the course of field experiments:

1. Investigations of the - increase of solubility of $KClO_3$.
2. Investigations to - cut down the inflammability of $NaClO_3$.
3. Investigations of - spreaders and stickers for use with chlorate sprays.
4. Investigations of - new killing agents.
   a. Colloidal ($Zn\ CO_3$, $CuCO_3$).
   b. Oil emulsions with toxic constituent.
5. Investigations of promotors or activators of physiological action of the toxic chemical used.

D. Field Work - 1927.

It is now felt that the work has progressed sufficiently to justify a thorough test of power equipment. A study of this apparatus should be made this winter by our methods study men in cooperation with the writer and it is planned to obtain a practical demonstration of several types of power units. A suitable area from next years eradication project in California has been selected and eradication of that area according to our best methods should be made early next season.

Experimental areas at Wallace, Santa and Clarkia, Idaho, should be rechecked and all available data recorded. It is advisable to continue our work in Idaho on a larger scale. This scheme of work should include the use of power equipment over accessible areas, as represented by last year's location at Clarkia, Idaho. Past experience has shown us that the different Ribes species show varying degrees of susceptibility to chemical treatment. For this reason it seems advisable to concentrate our attention on one or two of the more important species. R. petiolare and G. inermis (with the inevitably associated R. lacustre) represent a type that is very difficult and costly to hand eradicate. Experiments carried out during the summer of 1926 have shown that this type can be more cheaply "eradicated" by the chemical method. Until we are satisfied both with the chemical and methods of application we should focus our attention on areas similar to that of Clarkia, Idaho.

THE STORY OF CHEMICAL ERADICATION - Clarkia, Idaho.

W191.
Preparing the chemicals.

W194.
Loading up with a charge of spray solution.

W193.
Loading up with a charge of
spray solution.

W198.
Off for the job.

W185.
Chemical eradication crew at work spraying Ribes underneath brush.

W202.
Working in the brush.

RIBES ECOLOGY

by

W. A. Rockie
Assistant Pathologist

For the purposes of this report, the various studies undertaken on this project have been discussed under the following heads:

Germination Studies:

Ribes Germination Plots (Upper Priest River)
Germination on Old Camp Sites (Upper Priest River)
Viability of Ribes Seeds
Burn Studies

Growth Studies:

Leaf Area - Live Stem Ratio Study
Ribes lacustre Studies (Upper Priest River)
Ribes viscosissimum Studies (Elk River - Sanders)
Grossularia inermis Studies
Age Studies of Ribes

Ribes Germination Plots, Upper Priest River

I. Purpose of the Study

The purpose of the study of these plots is to aid in drawing conclusions regarding the respective parts played by the several causative factors in the germination role of Ribes.

II. Methods of Study Used

Each plot is one meter square. A check plot of equal size with undisturbed natural conditons adjoins each plot. Seeds of *R. viscosissimum* or *R. lacustre* or both were planted in both the plot and the check plot. No actual count of the seeds was made, but fifteen fruits of given species were planted for each square meter plot. Varying degrees and conditions of duff mantle and of shade conditions prevailed on the several plots. Plantings were made in the summer of 1925.

III. Results of Study

Plot A:

Practically level alluvial bottom site.
50% crown canopy 175 feet high.
No brush shade.
Ground heavily burned.
Planted to R. lacustre only.
Located in a large depressional area which had served in 1924 as the evening camp-fire site. Now 60% is covered with a very large vigorous Marchantia.
Four seedlings of R. lacustre found, so scattered as to indicate that they came from separate fruits. These seedlings are 0.1 of a foot maximum height.

Plot B:

Practically level alluvial land (immediately adjoining Plot A, but about 2 feet higher.)
50% crown canopy 175 feet high.
No brush shade.
Ground burned moderately.
Planted to R. lacustre only.
Twenty-two R. lacustre seedlings.
- 1 group of six plants together
- 2 groups of five plants each
- 6 separated plants

Two seedlings of entire number are over 0.1 foot high.
Check plot for Plot A and Plot B. (Adjoins plot B. on the east)
Conditions identical with Plot B.
Conditions practically identical with Plot A.
No Ribes planted.
No Ribes found.

Plot C:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned with scattering bits of charcoal.
Planted to R. viscosissimum only.
Ground almost entirely covered by Marchantia in 1926.
Three R. viscosissimum seedlings .15 of a foot high.

Plot D:

Practically level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned and loose remnants of duff scraped away for this germination test.
Planted to R. viscosissimum only.
Almost entirely covered with Marchantia in 1926.
Eight R. viscosissimum seedlings in the plot.
(Two other R. viscosissimum seedlings just outside the line of the plot but within the are from which the surface litter was scraped.)

Plot E:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned, having some scattered surface litter and charcoal.
Planted to R. viscosissimum only.
Ground 99% covered by very vigorous Marchantia.
No Ribes found.

Plot F:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned, partially covered with scattering bits of charcoal.
Planted to R. lacustre only.
Ground 2/3 covered by very vigorous Marchantia.
No Ribes found.

Plot G:

Level alluvial terrace 15 feet above Upper Priest River.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Ground artificially bared of duff mantle.
Planted to R. lacustre only.
Four R. lacustre seedlings less than .01 of a foot high.

Plot H:

Level alluvial terrace 15 feet above Upper Priest River.
99% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Ground artificially bared of duff mantle.
Planted to R. viscosissimum only.
No Ribes found.
Many seedlings of other genera germinating abundantly.
One seedling too small to identify which greatly resembles Ribes.

Plot I: (Same as Plot G except for duff)

Level alluvial terrace 15 feet above Upper Priest Riber.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Duff mantle left intact.
Planted to R. lacustre only.
No Ribes found.

Plot J: (Same as Plot H except for duff)

Level alluvial terrace 15 feet above Upper Priest River.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Duff mantle left intact.
Planted to R. viscosissimum only.
No Ribes found.

Plot K:

20% southwesterly slope.
No crown canopy.
Practically no brush shade.
Natural bare mineral soil.
Planted to R. lacustre only.
No Ribes found.

Plot L: (Same as Plot K)

20% southwesterly slope.
No crown canopy.
Practically no brush shade.
Natural bare mineral soil.
Planted to R. viscosissimum only.
No Ribes found.

Plot M:

20% southwesterly slope.
30% crown canopy of 25-30 year white pine with limbs to ground.
No brush shade other than pine.
Mineral soil covered with undecayed needles.
Planted to R. lacustre only.
No Ribes found.

Plot N: (Same as Plot M)

20% southwesterly slope.
30% crown canopy of 25-30 year white pine with limbs to ground.
No brush shade other than pine.
Mineral soil covered with undecayed needles.
Planted to R. viscosissimum only.
No Ribes found.

Plot O:

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff ground cover.
Planted to R. lacustre only.
No Ribes found.

Plot P: (Same as Plot O except for duff)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff artificially removed to bare mineral soil.
Planted to R. lacustre only.
No Ribes found.

Plot Q: (Same as Plot O except for Ribes species)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Ground cover consists of natural duff and a very rotton log.
Planted to R. viscosissimum only.
No Ribes found.

Plot R: (Same as Plot P except for Ribes species)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff artificially removed to bare mineral soil.
Planted to R. viscosissimum only.
No Ribes found. Young seedlings too small to identify which resemble Ribes.

Plot S: Four meters square.

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff conditions.
Planted to R. lacustre and R. viscosissimum only.
No Ribes found.

Plot T:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
60% Acer and Salix shade.
Duff from beneath white pine mature forest spread over alluvial soil.
Planted to R. lacustre only.
No Ribes found.

Plot U:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
60% Acer and Salix shade.
Duff from beneath white pine mature forest spread over alluvial soil.
Planted to R. viscosissimum only.
No Ribes found.

Plot V:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
No brush shade.
Duff from beneath white pine forest spread over alluvial soil.
Planted to both R. lacustre and R. viscosissimum seeds.
No Ribes found.

Of the 22 plots listed, 6 were on burned ground and 16 were on unburned soil. Four of the six plots on burned ground showed very positive germination totaling 26 *R. lacustre* and 11 *R. viscosissimum* while one of the 16 plots on unburned ground showed germination, four *R. lacustre* in all.

No germination was found on duff-covered soils, 10 plots of this character having been established.

Of 12 plots from which all duff was either lacking or was artificially removed, five plots showed a germination totaling 30 *R. lacustre* and 11 *R. viscosissimum.*

Of the 22 plots, 11 were established under fairly open light conditions, and 11 under very dense shade. Of the five plots showing germination, four were under open light conditions, and one was beneath dense shade. Twenty-six *R. lacustre* and 11 *R. viscosissimum* germinated under the lighter conditions, while four *R. lacustre* germinated under heavy shade.

IV. Summary

Duff appears to prohibit Ribes germination.
Light appears to stimulate Ribes germination.

Germination on Old Camp Sites

I. Purpose of the Study

The purpose of this study is to aid in drawing conclusions regarding the respective parts played by the several causative factors in the germination role of Ribes.

II. Methods of Study Used

All camp sites of previous years were carefully examined regarding the germination of Ribes on the areas where soil and other conditions had been altered by the artificial conditions of the camp development.

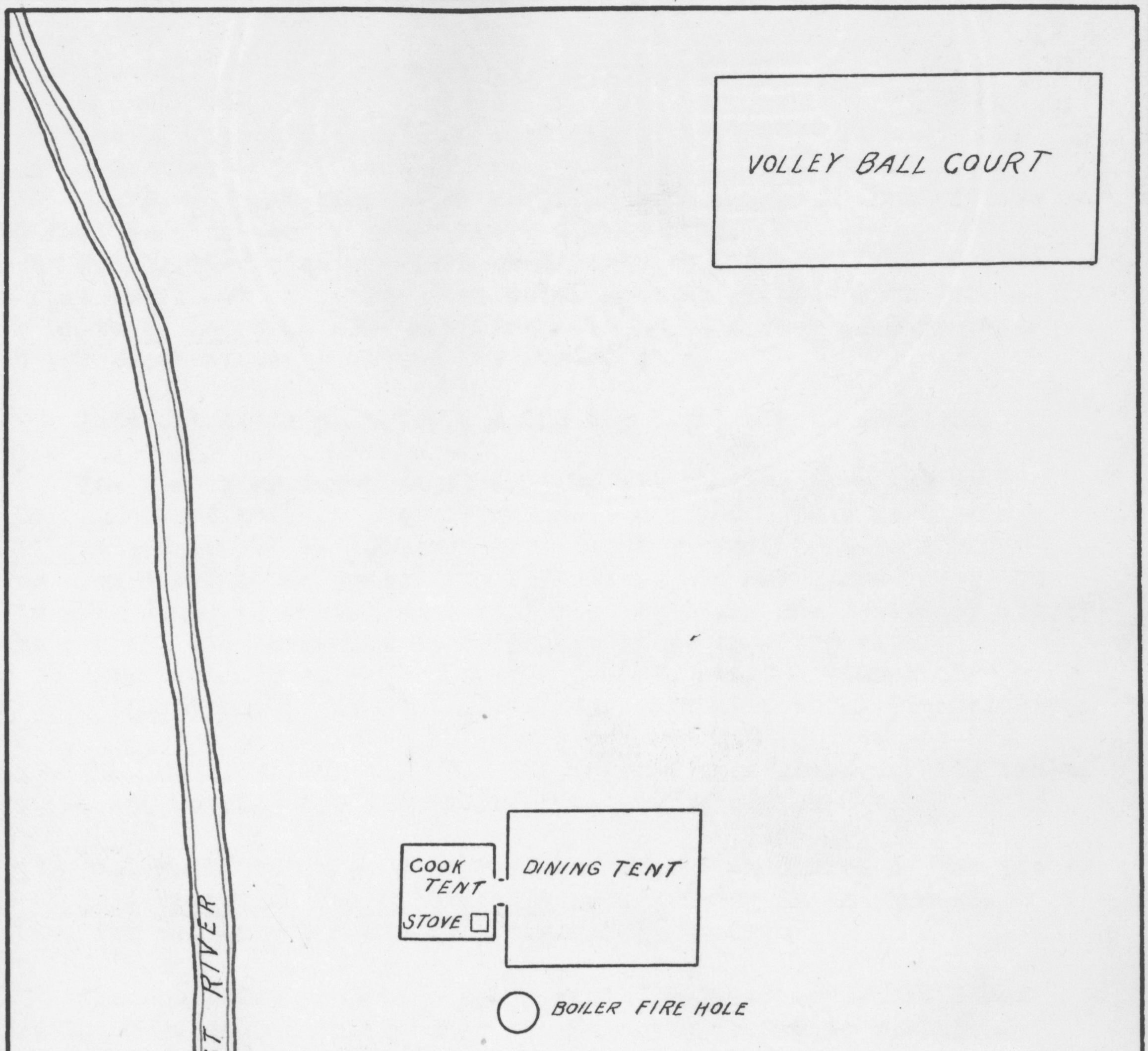
Plots were not laid out and the areas were studied merely in a general manner.

III. Results of Study

The site of 1924-1925 Camp One is in the valley of Upper Priest River, about 12 miles north of the Upper Lake. It is situated on the alluvial terrace lands at the river bank (not subject to overflow) beneath an overmature stand of cedar and hemlock. The terrace is about eight feet above the actual river level. This timber stand contains no *R. viscosissimum*, but has some *R. lacustre* in the wet openings.

Camp clearing and trampling had completely removed and destroyed all the duff from the ground areas studied here. Mineral soil, which was thus exposed over all the areas studied, was then covered in places with gravel dug from the stream bed.

A sketch on file in the Spokane office gives the general location of the various Ribes locations (Map No. 2).



MAP NO. 2

CAMP I UPPER PRIEST RIVER

Scale: 2" = 1 Ch. March 1927

The site of the cook tent was first studied.

One R. viscosissimum 1926 seedling with .1 of a foot of live stem had germinated 2 feet west of the stove, inside the tented area.

One R. viscosissimum 1926 seedling with .15 of a foot of live stem 10 feet east of stove, under table awning area.

One R. viscosissimum 1926 seedling with .05 of a foot of live stem 3 feet southwest of boiler fire hole, outside of the tented area.

One R. lacustre 1926 seedling with .1 of a foot of live stem 15 feet northwest of stove inside the tented area.

This situation probably had 30% sky light and 7% sunlight.

The tent area occupied in 1925 by the methods crew and by C. C. Epling of the ecology project was next studied. Many seedlings of R. viscosissimum and R. lacustre were found around the work table in river gravel which was taken from the stream bed and dumped over the floor to hold down the dust. Most of these seedlings are scattered singly over the gravel, but there are three clumps of R. lacustre which appear to have probably come from single fruits, and two clumps of R. viscosissimum probably of similar origin. Probably 50 R. viscosissimum and 100 R. lacustre are growing in this gravel-covered portion of the methods tent. C. C. Epling gathered and sorted many Ribes on this table. This situation probably has 40% skylight and 10% sunlight.

The south tent also had river-bed gravel on a part of the floor. One R. viscosissimum and two R. lacustre were growing in the gravel. This situation probably has 20% skylight and 1% sunlight

The southeast tent also had a small graveled area. No Ribes were found. This situation probably had 5% skylight and ½% sunlight.

All of the growing Ribes seedlings were on areas which were used in 1925. No Ribes were found on areas which had not been used in 1925. All of the duff on these sites had previously been destroyed by repeated tramping.

The volley-ball court showed no Ribes germination, though gravel had been spread over considerable of this area. This site probably had 5% skylight and ½% sunlight.

This camp was situated in a timber stand which was absolutely without R. viscosissimum, but R. lacustre were scattered along the river bank.

The light percentage figures are only relative, and represent merely an estimate of the facts.

The 1924 Camp Two at Lime Creek was carefully examined for germinated Ribes. Two R. lacustre plants of 1925 origin were found growing beside the old fire box. No other Ribes were found (except on the ecology germination plots.)

The 1924-1925 Ecology Camp at Lime Creek was also observed carefully. On the ground where all the sorting, counting, experimenting and wrapping of specimens and seed had been done by the ecology crew in 1924 and 1925, many 1926 seedlings of both R. viscosissimum and R. lacustre literally covered parts of the ground. Seedlings of both species were found less abundantly around the remainder of the campsite. This campsite is on ground which had previously no R. viscosissimum, although R. lacustre were common.

All of the Ribes germination at these old campsites is on exposed mineral soil. Much of the germination is on gravel removed from the stream bed and dumped on the ground. All of the campsites are situated in areas which are absolutely without R. viscosissimum, and yet R. viscosissimum germination is almost as common as R. lacustre germination.

IV. Summary

Many R. viscosissimum and R. lacustre seedlings were found growing on the ground occupied by campsites for blister rust activities during the two previous years. All germinated seeds are on exposed mineral soil. These germinated seeds appear to increase in number as the amount of light is increased.

The origin of the seeds which have germinated on these sites is unknown. Introduction and distribution of these seeds by rodents is deemed improbable because of the apparent relationship between human activities of the previous years and the location of most of the germinated Ribes.

It appears most likely that much of this germination has resulted from seeds which have been carried by human agencies, this germination being particularly abundant at the several points where members of the ecology personnel collected and sorted the Ribes seeds for later use.

Viability of Ribes Seeds

I. Purpose of the Study

The purpose of this study is to learn more about what factors influence and control the viable dormancy and the germination of Ribes seeds.

II. Methods of Study Used

At the University of Idaho, laboratory germination of Ribes seeds under different temperature condtions is being attempted. Each is kept constant at all times by an automatic oven control.

Collected mixed seeds of unknown identity which have been sifted from the soil and duff beneath a mature Ribes-free white pine stand have also been planted.

These germination studies of Ribes seeds are being carried on by Professor E. E. Hubert of the Forestry Department of the University of Idaho.

Other germination studies by the Forestry Department of the University of Montana, under the direction of Professor Dorr Skeels, are in progress.

III. Results of the Studies

No report on laboratory germination can be made at this time.

A study and bulletin entitled "The Vitality of Buried Seeds" (Journal of Agricultural Research, volume XXIX No. 7, October 1, 1924 Key No. G-466) lends credibility to the belief regarding the long viable dormancy of Ribes seeds. However, Ribes seeds were not included in this study, so that all direct evidence is lacking.

The manner and time of most Ribes germination, following either fire or logging, as it does, lends further strength to the belief that the viable dormancy of Ribes seeds may be much longer than was previously thought possible.

Further field studies are necessary for complete proof regarding the actual length of time that dormant Ribes seeds may remain viable.

IV. Summary

Actual experimental results are incomplete, and no report can be made at this time.

Burn Studies

I. Purpose of the Study

In the summer of 1923, while engaged in field studies of Ribes for the Western Office of Blister Rust Control, the writer made a number of observations which were rather of a revolutionary nature.

These observations did not agree with the accepted theory and practice. This material was merely mentioned at that time but was not incorporated into the office report.

The writer has been adding to these observations in a small way since that time, but not until the past summer has he had an opportunity to substantially enlarge upon these previous data.

This different thought regarding the life history of Ribes was presented to an ecology conference at the Spokane office on July 26th, 1926 and this conference decided that the writer should devote the remainder of the field season colecting data for substantiation of the theory presented to the conference.

Briefly, the thought to be proven follows: R. viscosissimum generally appears following forest fires, and it usually occurs only in even-aged stands.

Practically all distribution of R. viscosissimum seeds occurs by gravitational aid. The seeds fall from the bushes during the many fruiting years of the average plant, then they lay dormant in or beneath the duff ground cover for some indefinite period. Usually, the timber growth crowds out the R. viscosissimum bushes within about 20 years following the fire, and the production of Ribes seeds ends. However, the accumulated R. viscosissimum seeds of several years crops lay in waiting for proper germination conditions. This dormant period may apparently be the length of time required to produce a merchantable stand of timber.

These R. viscosissimum seeds will not germinate at all so long as the duff mantle (built up during the growth of this timber stand) remains intact. The shade of the timber itself also serves as an insulator against Ribes. The only ways in which these insulators against germination are removed from large areas, are by fire and cutting. The fire generally removes both insulators simultaneously, although this means where it is severe, is so hot that it may destroy the dormant Ribes seeds that are in waiting for germination conditions. Removal of the timber cover by logging does not so thoroughly open up the ground for Ribes germination as does the fire. Only where the duff is disturbed by the several activities of logging, can germination start. These places are chiefly where trees have hit the ground, where brush has been dragged piled and burned, and where logs have been dragged up to the skidways.

Apparently, the R. viscosissimum seeds will not germinate generally except upon the removal or destruction of the duff. The light factor, while not so absolute in its control, appears to play an important part.

Most of the studies made during the 1926 season center around the germination and growth of R. viscosissimum, with lesser emphasis on associated species of Ribes.

W175.
Effect of forest fire on vegetation. The white string marks the extreme edge of a burn at Meadow Creek, Idaho. This fire occurred during the summer of 1924. The unburned area, above the string, shows the original forest floor covering of ferns, twinflower (Linnaea borealis), Miner's Lettuce (Claytonia sp.), Dogwood (Cornus canadensis), etc. No Ribes were found. The burned area, below the string supports a flora of Fireweed (Epilobium augustifolia), Thimbleberry (Rubus parviflorus), and Ribes. A nearby strip shows Ribes at the rate of 11,484 R. viscosissimum and 2,194 R. lacustre per acre, of 1925 and 1926 germination. The maximum size of R. viscosissimum was 1.8 feet in height with 10.4 feet of live stem; for R. lacustre, 2.2 feet in height with 2.5 feet of live stem.

II. Methods of Study Used

Small burned and cutover areas, situated within white pine timber areas of all conditions, were examined.

Strips extending across the burned and into the unburned area on either side, together with sufficient cross-strips to complete a graphic picture of the burn, was the ideal sought. Some of the burned areas were thus completed, and others were not so completely studied.

The strips examined were usually one-half rod wide, though a few strips of one rod wide and a few of two rods width were examined. Some burns were studied by means of plots only, and others by both strips and plots.

Table No. 1 and map No. 1 show the method of recording data on these areas. This data covers Pierce Burn No. 2.

Additional observational notes and records of miscellaneous character were made whenever special conditions observed warranted different mention.

Conditions in the adjoining unburned timber areas were also carefully studied and recorded for comparative purpose.

A very briefly stated summary of general conditions within and adjoining each area studied is given herewith, together with a tabular summary of the several areas studied. (Table 2.)

Meadow Creek Burn No. 1

This area is in the NW$\frac{1}{4}$-NW$\frac{1}{4}$, Sec. 14, T. 42 N. R. 3 W. Boise Meridian. The north edge of strip one is at the west edge of the valley, just south of the National Forest Boundary.

This burn is on a steep easterly-facing slope adjoining the valley of Meadow Creek. The area is a compound 1924-1925 burn within a mature timber stand of from 100 to 160 years of age. The stand is Ribes-free, and is practically free of all underbrush. *R. lacustre* is common in the valley at the base of the slope, but not above the lower part of the burned area. In the burned area, *R. viscosissimum* are scattered generally and *R. lacustre* are very abundant on the lower slope of the hill, There are 1928 *R. viscosissimum* per acre, 846 *R. lacustre* per acre and 13 *G. inermis* per acre.

. This burn was stripped and cross-stripped to obtain this data, .52525 of an acre being examined in detail.

Table No. 1.

Pierce Burn No. 2 Strip 1.

Ribes No.	Ribes Species	Chain & Rod	Germination Year	Ht. of Bush in Feet	L.S. of Bush in Feet	Dead Stem of Bush in Feet	New Growth of L.S. in Feet	Special Notes
1	visco.	1-1	1922	.8	1.8	.3	.6	In heavy bracken and grass.
2	visco.	1-1	1922-23	.6	.6	.3	.3	
3	visco.	1-1	1922-23	.45	.50	.3	.4	
4	visco.	1-1	1922	.5	.5	.25	.2	2" W. of No. 3.
5	visco.	1-1	1923 or older	.4	.4		.18	7" W. of No. 3.
6	visco.	1-1	1923 (?)	.3	.3	.05	.2	1" W. of 5" dead white pine.
7	visco.	1-1	1922	.30	.75	.12		
8	visco.	1-1	1922	.25	.25	.00	.05	On N. edge 8" dead white pine.
9	visco.	1-1	1922	.6	1.2	.5	.1	Nipped back this year.
10	visco.	1-1	1922	.4	.8	.1	.1	
11	visco.	1-1	1922	.3	.4		.1	1' N. of No. 10.
12	visco.	1-1	1922	.4	.6		.15	1' N.W. of No. 8
13	visco.	1-1	1922	.35	.35		.02	
14	visco.	1-1	1922	.35	.7	.15	.1	
15	visco.	1-2	1922	.5	.5		.15	
16	visco.	1-2	1922	.45	.6	.45	.05	
17	visco.	1-2	1922 (?)	.3	.45	.2	.1	1' W. of No. 16.
18	visco.	1-2	192-(?)	.2	.2	.45	.12	
19	visco.	1-2	1922 (?)	.2	.2	.02	.03	
20	visco.	1-2	1922	.35	.5.	.15	.18	1' W. of No 18.
21	visco.	1-2	1922	.25	.4	.10	.06	1.5' N. of No. 20.
22	visco.	1-2	1922	.3	.6	.1	.3	
23	visco.	1-2	1922	.6	1.0	.5	.4	
24	visco.	1-2	1922 (?)	.6	.4	.5	.15	
25	visco.	1-2	1922	.25	.12	.4	.01	
26	visco.	1-2	1922	.45	.9	.1	.1	
27	visco.	1-2	19-	.5		.45		
28	visco.	1-2		.12		.12		
29	visco.	1-2	192- (?)	.3	.25			
30	visco.	1-2	1922	.2	.2	.15	.1	All in group 3" to 12" W. of 12" D.F. stump.
31	visco.	1-2	1922	.25	.3	.02	.01	
32	visco.	1-2	1922	.2	.2	.05	.05	
33	visco.	1-2	19-	.25		.25		
34	visco.	1-2	1922	.8	1.3	.3	.15	
35	visco.	1-2	1922	.25	.25	.15		With No. 34.
36	visco.	1-2	1922	.7	1.1	.1	.2	1' N. of No. 35.
37	visco.	1-2	1922	.3	.45	.15	.1	
38	visco.	1-2	19-	.28		.28		
39	visco.	1-2	1922	.15	.15	.12	.01	With No. 37.
40	visco.	1-2	19-	.25		.25		
41	visco.	1-2	1922	.45	.50	.02	.1	
42	visco.	1-2	1922	.25	.22	.1	.01	
43	visco.	1-2	1922	.2	.38	.2	.35	1' N. of No. 37.
44	visco.	1-2	1922	.2	.2	.08	.01	With No. 43.
45	visco.	1-2	1922	.3	.3	.12	.01	1' NW. of No 34.
46	visco.	1-2	1922	.25	.25	.1	.01	
47	visco.	1-2	1922	.2	.15	.12	.05	With No 46.
48	visco.	1-2	1922	.3	.5	.1	.01	1' NW. of No. 45.
49	visco.	1-3	1922	.4	.6	.15	.1	8" W. of No 48.
50	visco.	1-3	1922	.2	.4	.2	.12	8" W. of No 48
51	visco.	1-3	1922	.4	.4	.12	.05	
52	visco.	1-3	1922	.6	.4	.03	.01	
53	visco.	1-3	1922	.35	.5		.08	
54	visco.	1-3	1922	.25	.25	.05		Bunch 8" N. of No. 50.
55	visco.	1-3	1----	.2		.4		
56	visco.	1-3	19---	.15		.15		
57	visco.	1-3	1922 (?)	.2	.2		.01	
58	visco.	1-3	1922	.6	.75	.1		
59	visco.	1-3	1922	.25	.25		.05	
60	visco.	1-3	1922	.5	.5	.05	.01	
61	visco.	1-3	1922	.3	.3	.01	.08	With No. 60.
62	visco.	1-3	1922	.8	1.0	.25	.2	
63	visco.	1-3	1922	.3	.3	.1	.01	
64	visco.	1-3	1922	.45	.45	.1	.12	
65	visco.	1-4	1922	.3	.5	.1	.8	
66	visco.	1-4	1922	.3	.6	.2	.12	
67	visco.	1-4	1922	.5	1.0	.4	.2	Together.
68	visco.	1-4	1922	.7	1.2	.7	.1	
69	visco.	1-4	1922	..25	.25		.01	
70	visco.	1-4	1922	.3	.3	.15	.08	
71	visco.	1-4	1922	.3	.45		.08	
72	visco.	1-4	1922	.22	.45	.4	.01	With No. 71.
73	visco.	1-4	1922 (?)	.35	.45	.02	.08	
74	visco.	1-4	1922 (?)	.6	1.2	.4	.15	
75	visco.	1-4	1922	.5	.75	.1	.03	With No. 74.
76	visco.	2-1	1922	.45	.45	.07	.02	
77	visco.	2-1	1922 (?)	.4	.4		.01	
78	visco.	2-1	1922 (?)	.25	.25	.25	.01	8" NW. of No. 85.
79	visco.	2-1	19- (?)	.25	.30	.4	.13	
80	visco.	2-1	1922	.8	2.5	.7	.5	
81	visco.	2-1	1922	.4	.42	.1	.05	
82	visco.	2-1	19- (?)	.3	.6	.08	.5	
83	visco.	2-1	1922 (?)	.7	1. 2	.2	.2	
84	visco.	2-2	1922	.55	.5	.5	.01	
85	visco.	2-2	19- (?)	.6	.9	.4	.05	
86	visco.	2-2	19-(?)	.7	.7	.2	.1	

Pierce Burn No. 2 (Strip A)

1	visco.	A-1	1922	.5	1.40	.2	.2	1' E. of 11" D.F. Stump.
2	visco.	A-1	1922	.4	.7	.6	.18	4" E. of 11" D.F. Stump.
3	visco.	A-1	19-(?)	.5	.7	.1	.2	40" E. of 11" D.F. Stump.
4	visco.	A-1	1922	.35	1.0	.6	.05	60" NE of No. 2.
5	visco.	A-1	1922(?)	.6	1.5	.5	.5	3" N. of No. 4.
6	visco.	A-1	1921-22(?)	.2	.25	.08	.1	15" N. of No. 3.
7	visco.	A-1	1922	.3	.42	.2	.02	2' N. of above Stump.
8	visco.	A-1	1922	.6	.6	.7	.25	6" NW of No. 7.
9	visco.	A-1	1922	.3	.48	.15	.2	On bank above road.
10	visco.	A-1	1922 or 23	1.8	1.9	.8	.9	6" E. of No. 9.
11	visco.	A-1	1922 (?)	.8	.65	1.2	.25	2" N. of No. 2.

Pierce Burn No. 2 (Strip B)

1	visco.	B-1	1922	.3	.1	.5	.01	
2	visco.	B-1	192-(?)	.3	.3	.18	.01	
3	visco.	B-1	1923 (?)	.2	.18	.2	.01	
4	visco.	B-1	1922	.3	.35	.1	.02	4" SW of No. 3.
5	visco.	B-1	1922	.3	.5	.2	.02	
6	visco.	B-1	19I (?)	.2	.2	.3	.01	6" W. of No. 5.
7	visco.	B-1	19 (?)	.3	.3	.3	.08	12" W. of No. 6.
8	visco.	B-1	1923 (?)	.25	.25	.12		15" SE of No. 7.
9	visco.	B-1	1922 (?)	.2	.3	.05	.01	
10	visco.	B-1	1922	.2	.42	.1	.10	2' N. of old road.

Pierce Burn No. 2 (Strip C)

1	visco.	C-1	1922	.25	.45	.45	.04	
2	visco.	C-1	(?)					
3*	visco.	C-1	1920	3.3	7.5	1.5	2.5	Under south edge of down log. On disturbed ground where falling tree plowed ground.
4*	visco.	C-1	1920					Under N. edge of small log. Pulled out to determine its age.

* Ribes 3 and 4 in opening in timber under north edge of large Service Berry bush, but with considerable afternoon sunshine. Building of the later of the two roads here probably opened it up sufficiently for these Ribes. They appear very definitely to be 1920 germination, so the road was probably built in 1919 or 1920, and the wedge area was burned a year or so later.

Pierce Burn No. 2. (Strip D)

1	visco.	D-1	1922	.5	.5	.25	.12	
2	visco.	D-1	1922	.35	.25	.03	.01	
3	visco.	D-1	1922	.3	.7	.45	.01	
4	visco.	D-1	1922	.35	.45	.2	.03	
5-6	visco.	D-1	1922	.35	.35	.05	.01	
7	visco.	D-1	1922	.35	.5	.05	.05	Together. Each similarly injured by grazing.
8	visco.	D-1	1922	.35	.5	.02	.05	
9	visco.	D-1	1922	.30	.42	.08	.10	
10	visco.	D-1	1922	.4	.4	.4	.02	

Meadow Creek Burn No. 2.

This area is located in the $NW\frac{1}{4}$-$SW\frac{1}{4}$, Sec. 11, T. 42 N. R. 3 W. Boise Meridian. It is 32 chains north of the National Forest boundary, and one chain west of the west edge of the valley.

The area was burned in September 1925. Previous to this fire, it was a reproduction thicket of about 25 to 27 years of age (1898 burn.) It still had old bushes of R. viscosissimum and R. lacustre in the openings. This reproduction thicket, where unburned, probably has from 70 to 100 Ribes per acre, approximately 70% R. viscosissimum and 30% R. lacustre.

The area is on a steep easterly slope (the west side of the valley of Meadow Creek.)

The burn of September 1925 has Ribes of 1926 germination at the rate of 36000 R. viscosissimum and 1030 R. lacustre per acre. All of these newly germinated Ribes are either at the very edges of the burn or on lightly burned portions of the ground. None are on heavily burned spots.

This area was studied by means of a single half-rod strip crossing a narrow neck of this burn from north to south, and supported by additional general observational notes of E. E. Hubert, Thomas Large and the writer.

Emida Burn No. I.

This area is located 2 chains south of the $W\frac{1}{4}$ corner of Sec. 21, T. 43 N., R. 2 W., Boise Meridian. The area is very inaccessible and difficult to find.

This area burned in 1923. Most of this area is but lightly burned, leaving much of the crown canopy still alive and with numerous islands of unburned ground, particularly in the south half of the area. The burn is in the center of an extensive white pine stand.

Blister rust reconnaissance shows the region as having no R. viscosissimum. We found 3 R. viscosissimum bushes about three miles distant, but no other indication of its presence. Reconnaissance records show 4 R. lacustre per acre, mainly along draws.

The Ribes show a general distribution within the stripped portion of the area. The northerly part of the burn has about 100 Ribes per acre, the southerly part about 10 per acre, with an average of 51 per acre. About two-thirds of these are R. viscosissimum and about one-third are R. lacustre. Strips, cross strips and plots totaling 1.455 acres were examined in detail.

Hog Meadow Burn No. I.

The area is located in the east part of lot 10, Sec. 3, T. 40 N., R. 1, W., Boise Meridian. It is about 200 yards northwest of the Potlatch Lumber Company camp, and the south end of the strip is about 20 feet north of the logging railroad.

This study was made of a logged slashing area, which was partly broadcast burned and party piled and burned. Separation of the areas burned by each method proved impossible, and the data is assembled as of a single area.

The area is on a gentle southerly slope, which supports the cull timber of a white pine stand. The area was Ribes-free, there being no Ribes on adjoining unlogged lands.

The slash was burned in November 1925, and in May, 1926. There are no Ribes in the unburned strips and islands within the area studied. There were 8200 R. viscosissimum seedlings per acre of 1926 germination in the skid trails and other spots where mineral soil has been mechanically exposed. There are 77 R. viscosissimum per acre of 1925 germination and 423 R. viscosissimum per acre of 1926 germination on the area burned in November, 1925. There are 250 R. viscosissimum per acre of 1926 germination on the area burned in May 1926.

Observations over the entire burn supported by a strip (half rod wide) extending for 6 chains through the area, constitute the study of this area.

East Fork Potlatch River Burn No. I.

The area is in the NE$\frac{1}{4}$-SW$\frac{1}{4}$ Sec. 6, T. 40 N., R. 1 E., Boise Meridian.

This area is located on the north side of the Bovill-Elk River highway, about 100 feet from the road. The area is about 200 yards southeast of the bridge which crosses the East Fork of Potlatch River.

The surrounding timber stand has been logged. It is Ribes-free white pine type. The slashing and other litter remaining after logging was partly piled. It was then burned early in the spring of 1926. The burn was very uneven with some spots heavily burned, some lightly burned, some barely scorched and other portions remaining entirely unburned.

Unburned portions of this area show 130 R. lacustre and 44 R. petiolare per acre where the duff has been disturbed, but the undisturbed areas of the unburned forest floor have no Ribes. The above Ribes are of mixed ages, most of them starting before the fire occurred.

The burned portions of the area have an average stand of 1051 R. viscosissimum 1926 seedlings and 282 R. lacustre 1926 seedlings per acre. Twenty-six R. lacustre per acre had lived through the fire on the burned area.

On the skid trails and other areas where duff was mechanically removed, 1714 R. viscosissimum per acre equally divided into 1, 2 and 3 year old bushes, were found.

Studies in this area consisted of one east to west strip (half-rod wide) from within the unburned timber across the burn into the unburned area on the opposite side.

East Fork Potlatch River Burn No. II.

This area is about ½ mile farther from Bovill toward Elk River, Idaho on the north side of the highway, than East Fork Potlatch River Burn No. I. The strip begins at a logging road leading northeast from the main highway.

It is within a logged area of white pine type, with the slashing apparently burned late in 1925. Most of the ground was quite heavily burned into the mineral soil. Very little vegetation is yet showing on the burned area.

The adjoining unburned timber areas show scattered old R. viscosissimum bushes. R. viscosissimum of 1926 germination had started on the burned ground at the rate of 2000 per acre, R. lacustre of 1926 origin at 133 per acre.

This area was studied by a single strip (half-rod wide) one chain long, supported by observational notes regarding general adjoining conditions.

Oviat Burn No. I.

This area was not located by section. The road to Park, Idaho from the Bovill-Elk River road leaves the latter about 8 miles southwest of Elk River. After following the Park road about 3 miles from the main highway, a road forks is encountered. (The left hand fork is but a little traveled although it is a plain road. It leads steeply downhill from the forks to the bottom of a deep draw, crosses this draw and joins a completed railroad grade.) Keep on the main Park road 14.8 chains beyond this road forks to an old pile of skidded logs. The burn is 6 chains south 80 degrees east from this point.

This small spot burn occurred in 1925. It covered only about one-fourth of an acre before it was trenched and stopped.

The area is on a gentle easterly slope in a mature stand of Ribes-free white pine type. The surrounding timber supports very little undergrowth. The ground is generally deeply covered by duff. Scattered unburned islands of the original forest floor are scattered through all parts of the burn, and about 60% of the crown canopy was not killed by the fire.

The opening made by the burn is also so small that very little sunlight reaches the ground within the area.

The entire burn was carefully searched for Ribes. No old Ribes bushes were found either inside or outside the area. Two R. viscosissimum, 1926 seedlings, were found, one on the inside of the fire trench, and one on some exposed mineral soil beside an upturn.

Oviat Burn No. II.

The area was not located by section. The Park road forks from the Bovill-Elk River road about 8 miles from Elk River. About 3 miles toward Park on this road an untraveled branch road forks to the left across a draw and 50 yards distant, a railroad grade is found. Follow this grade about one mile to its end and strip No. 1 is about 100 feet north of the grade.

This area was burned in 1925. The fire was very severe in the center of the burned strip, and decreasingly intense toward either edge.

The area is a gentle southerly slope within a mature stand of white pine type. Some logging operations had been carried on within the area, though the fire was so severe that only locally can trace of previous conditions be found.

Old roads and trails had crossed the area of the fire, and parts of these previous openings were not burned over. Old R. viscosissimum bushes were scattered along these openings within the area, but were not present in the virgin portions of the stand.

The burn was studied by a single strip, extending from within the unburned area on one side of the burn, into the unburned virgin timber on the other side.

There are about 4250 R. viscosissimum per acre across the entire burned portion, but these are very much localized.

Where the strip was begun, R. viscosissimum of 1926 germination is growing in the fire trench at the rate of 4,800 bushes per acre.

Beginning at the inner edge of the fire trench, the first half chain strip (one half-rod wide) has 4960 R. viscosissimum per acre. The second half-chain has 1600 R. viscosissimum per acre, while the next two chains of strip, which were in the hottest part of the fire, have no R. viscosissimum germination. Here an unburned roadway was crossed, and adjoining this road, the fire was so much less severe that for the next half-chain of strip, there are 4800 R. viscosissimum per acre. The next seven half-chain lengths have 160, 4480, 960, 7520, 6720, 10240, and 16000 R. viscosissimum per acre respectively.

The last half-chain listed ends at the fire trench. The fire trench at this edge has 66000 R. viscosissimum per acre.

A few R. lacustre of inconsequential importance were encountered in various parts of this strip, though they are nowhere abundant.

Pierce Burn No. I.

The area was not located by section, but adjoins the new Forest Service road to Bungalow about ½ mile from Pierce, Idaho on the right (upper) side of the road. The area is a gentle southwesterly slope immediately adjoining the road and is only about 1/100 acre in extent. It was probably burned in 1925.

The timber is an open stand of lodgepole pine immediately adjoining and within a general white pine stand. No Ribes were found in the adjoining unburned area.

The burn was light on approximately 2/3 of the area, burning all of the duff on about 1/3 of the area only. The entire area of the burn was carefully searched for Ribes. 900 R. lacustre, 1926 seedlings, per acre were scattered over the burn. These seedlings average about .25 inch in height. No R. viscosissimum was found.

Pierce Burn No. II.

This area is about ½ mile in a northeasterly direction from Pierce, Idaho. It is on the old Bungalow road, about 500 yards beyond the Pierce schoolhouse. Its situation and condition is shown on map No. 1 and Table No. 1. It is within a dense stand of 40-60 year old white pine.

The surrounding timber stand is Ribes-free. At least an acre surrounding the area was carefully searched for Ribes.

Some years ago, the old road was changed to eliminate several steep rises, and at the same time the timber growth was slashed on either side to more effectively open the roadway. A small wedge of this slashing lays between the new road and a loop of the old road, and completely surrounded by the two loops of the road. The slashing on this small wedge of land, in some manner, was burned, probably in 1921. All other slashed areas along the road remain undisturbed and are Ribes-free.

The small burned area has 5336 _R. viscosissimum_ per acre, apparently all of 1922 germination. There is very little other vegetation. Most of the Ribes have been nipped back by grazing. Practically all of the bushes have from 2" to 4" of roots exposed, due to having been partially pulled out of the soil by the grazing of stock.

Lakeview Cutover No. I.

This area is in SE-SW¼, Sec 8, T. 53 N., R. 1 W., on the south shore of Lake Pend Oreille, and by compass is due true south from Cape Horn, on the west side of the lake.

The area is at the base of the slope and is just above high-water line of the lake shore.

All timber cover has been slashed on an area of approximately 1/10 acre in making opening for wire on telephone line. The timber growth which was slashed was entirely young stuff, and no overhead shade remains. The duff was practically undisturbed, and the slashing lays where it fell, so that soil conditions are practically as they were before the change occurred.

This slashing, by the appearance of the small stumps remaining, took place several years ago, but no Ribes are present on the area. Neither are they present on the timbered area immediately adjoining.

Conditions here are almost identical with those which prevail on Lakeview Burn No. 2 about a mile to the eastward except that here the slashing and duff remain undisturbed and the _R. viscosissimum_ are not present.

Lakeview Burn No. I.

This area is located in the SW$\frac{1}{4}$-SE$\frac{1}{4}$, Sec. 4, T. 53, N., R. 1 W., and extends southward into the NW$\frac{1}{4}$-NE$\frac{1}{4}$, Sec. 9, T. 53 N., R. 1 W. The plots occur at the end of each chain, extending southward from the west end of the lime plant.

On August 5, 1925, fire broke out in the lime plant of the International Portland Cement Company, about one mile west of Lakeview, Idaho, and in five minutes (the manager's version) had swept through the plant, into and over the entire northwest slope about the mill. It then extended more slowly in several directions over adjoining parts of the mountain.

Scattered mature R. viscosissimum were seen around this physical development, beside cuts and along roads and trails. No R. viscosissimum was seen within that portion of this timbered slope which remained unburned and in the natural condition.

The entire northerly slope is a very steep rock slide, only partially covered with soil. The loose mantle is so unstable that the rock beneath one's feet slides about 50% of the time. There is very little fine-textured soil mantle, and that only in depressional spots of varying extent.

Since the fire occurred there is no live timber growth, although the greater part of the charred remains is still standing. These standing skeletons are all charred from top to bottom, thus indicating the fierceness and speed of the fire.

The present vegetation consists chiefly of Epilobium, Ribes, Rubus, and Opulaster. R. viscosissimum seedlings of 1926 germination are very general but there is practically no R. lacustre.

The fire left practically no duff but was unable to burn deeply into the soil because of its patchy and rocky character. It was estimated that:

20% of the surface is now plant-covered soil,
30% of the surface is now bare slide rock,
50% of the surface is now bare soil.

A zig-zag course was run up the hill through this burned area, and at the end of each chain traveled, a 1/1000 acre square plot was counted for Ribes. Eight such plots were recorded. The results were as follows:

Plot	No. Ribes Bushes	Species	Year of Germination	Average Height in feet	Average Live Stem in feet
1	5	R. visco.	1926	0.5	0.5
2	7	R. visco.	1926	0.2	0.2
3	5	R. visco.	1926	0.4	0.4
4	2	R. visco.	1926	0.6	0.7
5	4	R. visco.	1926	0.3	0.3
6	3	R. visco.	1926	0.3	0.3
6	1	R. lacustre	1926	0.2	0.2
7	0	------------	----	---	---
8	20	R. visco.	1926	0.1	0.1
	5.75	R. visco.	1926	.2	.2
Average	0.13	R. Lacustre	1926	.2	.2

Although only smaller bushes were encountered on these plots, many 1926 R. viscosissimum 1.0 to 1.5 feet high were seen, several 2.0 feet high were found, and one bush with a height of 2.2 feet and with 3.2 feet of live stem was found.

R. lacustre is noticeably absent over most of the area, the one listed in the table being the only one seen on the entire burn.

Summary

Burned August 5, 1925.

No mature R. viscosissimum encountered in unburned timber area.

R. viscosissimum seedlings average 5750 per acre.

Lakeview Burn No. II.

This area is located either in the NE$\frac{1}{4}$-NW$\frac{1}{4}$ or in the SE$\frac{1}{4}$-NW$\frac{1}{4}$, Sec. 9, T. 53. N., R. 1 W., but without actually surveying out the forty lines, it cannot be more definitely located.

This small spot-fire situated about one-half mile southwest of the International Portland Cement Company line mill was studied. It is about 5 chains southwest of the southwestern-most cabin. The burn extended from high-water line on the lake shore up into the hillside timber. The burned area varies from 20 to 50 feet in width, extending directly up the hillside.

Neither R. viscosissimum nor R. lacustre were seen outside of the burned area. A very few G. irrigua were found on sliderock beside the lake shore in an adjoining unburned area.

The burn was not severe, although the duff was entirely destroyed over most of the area.

The burned area shows R. viscosissimum coming in at the rate of from 1000 to 10000 seedlings per acre. These seedlings are all from seed in 1926, although the seedlings have made a much smaller average growth than in the main burn nearer the mill. These seedlings are universally distributed over the burned area, though not of uniform abundance.

Athol Burn No. I.

This area is located in the NE$\frac{1}{4}$-NE$\frac{1}{4}$, Sec. 13, T. 53 N., R. 3 W., and is about 4 miles east of Athol, Idaho.

As you approach this burned area on the east-west road from Athol, the road leaves the green timber growth and extends between two burned areas. This burned area is flat sandy land which supports a moderately heavy growth of small lodgepole timber.

No Ribes were encountered in this burned area, except along the south edge adjoining the green timber growth.

A rough count of the Ribes encountered was made. Beginning at the edge of the green timber, and extending out into the burned area the count was recorded. The results of this approximate count follow:

First rod from unburned timber 30,000 to 40,000 Ribes per acre.
40% R. viscosissimum, 60% G. inermis.
Second rod from unburned timber 1500 Ribes per acre.
20% R. viscosissimum, 80% G. inermis.
Third rod from unburned timber 500 Ribes per acre.
100% G. inermis.
Fourth rod from unburned timber 60 Ribes per acre.
100% G. inermis.
Fifth rod from unburned timber 0 Ribes per acre.
Sixth rod from unburned timber 0 Ribes per acre.
Seventh rod from unburned timber 0 Ribes per acre.
Eighth rod from unburned timber 0 Ribes per acre.

The R. viscosissimum and G. inermis are abundant along the south and west edges of this burned area. The other sides of the burn were not studied.

Germination of both species appears to have been entirely in 1924. This determination was based on the following count.

Of 50 R. viscosissimum on which the age was taken, 47 gave 1924 origin, and 3 were listed as of doubtful age.

Eighty-two G. inermis were counted as to date of origin. Fifty-six of these were definitely of 1924 origin and 26 were of doubtful age.

Table No. II.

Burn Study of Ribes Germination.

Name of Burn	Date of Burn	No. of Strip or Plot	Total Area Examined in Acres	Exposure or Site	On Unburned Timber Area: No. Ribes per Acre of 1 year age	No. Ribes per Acre of 2 year age	No. Ribes per Acre of 3 year age	No. Ribes per Acre over 3 year age	No. Ribes per Acre all ages	Area Examined (in Acres)	On Undisturbed Slashing: No. R. per Acre of 1 year age	No. R. per Acre of 2 year age	No. R. per Acre of 3 year age	No. R. per Acre over 3 year age	No. R. per Acre all ages	Area Examined (in Acres)
Meadow Creek No. 1	1924-25	Strip 1	.225	E	17 V. 17 L.			34L.	17V. 51L.	.071						
Meadow Creek No. 1	1925	Strip 9B1	.0125	E						.0095						
Meadow Creek No. 1	1924-25	Strip 9A	.1	E						.025						
Meadow Creek No. 1	1924-25	Strip C	.1375	E												
Meadow Creek No. 1	1924	Strip D	.025	E						.01525						
Meadow Creek No. 1	1925	Strip E	.024125	NE						.016375						
Meadow Creek No. 1	1924	Strip E	.001125	NE												
Meadow Creek No. 2	Sept. 1925	Strip 1	.015	E	1440 V. 800L.			480V.	1920V. 800L.	.00625						
Emida No. 1	1923	Strip 1	1.355	N												
Emida No. 1	1923	Plot 1	.1	NW												
Hog Meadow No. 1	Nov. 1925	Strip 1	.059	SW						.028						
Hog Meadow No. 1	May 1925	Strip 1	.016	SW												
East Fork Potlatch R. No. 1	Spring 1926	Strip 1	.08745	SW	22L. 44P.	86 L.	22L.		130L. 44P.	.045						
East Fork Potlatch R. No. 2	Fall 1925	Strip 1	.0125	SW						.005						
Oviat No. 1	1925	Plot 1	1.307	E						1.0						
Oviat No. 2	1925	Strip 1	.09375	S				678V.	678V.	.010325						
Pierce No. 1	1925	Plot 1	1.01	SW						1.0						
Pierce No. 2	1921(?)	Strips 1, A,B,C,D	1.1223	W				2 V.	2 V.	1.0						0.1
Lakeview Cutover, No. 1	Unburned	Plot 1	.1	N												0.1
Lakeview Burn No. 1	Aug. 5 1925	Plots 1 to 8	1.008	NW						1.0						
Totals & Averages			6.81185		2.4 V. 1.7 L. .5 P.	0.9 L.	0.2L.	2.8V. .5B.	5.2V. 3.3L. .5P.	4.2314						0.2

Name of Burn	On Exposed but unburned Areas of Mineral Soil: No. Ribes per Acre that Germinated before uncovering of soil	No. Ribes per Acre that Germinated same year as uncovering of soil	No. Ribes per Acre that Germinated 1st year after uncovering of soil	No. Ribes per Acre that Germinated 2nd year after uncovering of soil	No. Ribes per Acre that Germinated still later	No. Ribes per Acre all ages	Area Examined (in Acres)	On Timber Areas having only Ground Cover Burned off: No. Ribes per Acre that Germinated before fire	No. Ribes per Acre that Germinated same year as Fire	No. Ribes per Acre that Germinated first year after fire	No. Ribes per Acre that Germinated 2nd year after fire	No. Ribes per Acre that Germinated still later	No. Ribes per Acre all ages	Area Examined (in Acres)
Meadow Creek No. 1 (Strip 1)			514 V. 171 L.			514 V. 171 L.	.0175							
Meadow Creek No. 1 (Strip 9B1)														.003
Meadow Creek No. 1 (Strip 9A)		222 L.	9778 L.			10000 L.	.0045							
Meadow Creek No. 1 (Strip C)		667 V.	667 V. 2000 L.			1333 V. 2000 L.	.003							
Meadow Creek No. 1 (Strip D)														
Meadow Creek No. 1 (Strip E, 1925)														
Meadow Creek No. 1 (Strip E, 1924)														
Meadow Creek No. 2														
Emida No. 1 (Strip 1)														
Emida No. 1 (Plot 1)														
Hog Meadow No. 1 (Nov. 1925)			8200 V.			8200 V.	.005							
Hog Meadow No. 1 (May 1925)														
East Fork Potlatch R. No. 1		571 V.	571 V.	571 V.		1714 V.	.00175							
East Fork Potlatch R. No. 2														
Oviat No. 1				80 V.		80 V.	.025							.282
Oviat No. 2			30165V. 781L.			30165 V. 781 L.	.0025625							
Pierce No. 1														
Pierce No. 2														
Lakeview Cutover, No. 1														
Lakeview Burn No. 1														
Totals & Averages		51 V. 17 L.	2192 V. 927 L.	50.V.		2293 V. 944 L.	.0593125							.285

Name of Burn	On Light Burns: No. Ribes per Acre that Germinated before fire	No. Ribes per Acre that Germinated same year as fire	No. Ribes per Acre that Germinated first year after fire	No. Ribes per Acre that Germinated 2nd year after fire	No. Ribes per Acre that Germinated Still later	No. Ribes per Acre all Ages	Area Examined (in Acres)	On Severe Burns: No. R. per Acre that Germinated Before fire	No. R. per Acre that Germinated same year as fire	No. R. per Acre that Germinated first year after fire	No. R. per Acre that Germinated 2nd year after fire	No. R. per Acre that Germinated still later	No. Ribes per Acre All ages	Area Examined (in Acres)
Meadow Creek No. 1 (Strip 1)	1 L.		1597 V. 7 in. 432 L.	22 V. 51 L.		1619 V. 7 in. 490 L.	.1365							
Meadow Creek No. 1 (Strip 9B1)														
Meadow Creek No. 1 (Strip 9A)	1 L.		667 V. 809 L.	14 L.		667 V. 866 L.	.0705							
Meadow Creek No. 1 (Strip C)		61 V. 14 L.	768 V. 14 in. 401 L.	14 V. 37 L.		883 V. 14 in. 452 L.	.1345							
Meadow Creek No. 1 (Strip D)			4550 V.	100 V.		4650 V.	.00975							
Meadow Creek No. 1 (Strip E, 1925)		9419 V. 1807 L.	2065 V. 387 L.			11484 V. 2194 L.	.00775							
Meadow Creek No. 1 (Strip E, 1924)			669 V. 5333 L.			669 V. 5333 L.	.001125							
Meadow Creek No. 2	115 L.		36000 V. 915 L.			36000 V. 1030 L.	.00875							
Emida No. 1 (Strip 1)	1.5 L.	27 V. 14 L.	7 V. 1.5 L.			34 V. 17 L.	1.355							
Emida No. 1 (Plot 1)		30 V. 80 L.	10 V. 90 L.			40 V. 170 L.	.1							
Hog Meadow No. 1 (Nov. 1925)		77 V.	231 V.			308 V.	.026							
Hog Meadow No. 1 (May 1925)		250 V.				250 V.	.016							
East Fork Potlatch R. No. 1	26 L.	1051 V. 282 L.				1051 V. 308 L.	.039							
East Fork Potlatch R. No. 2			2000 V. 133 L.			2000 V. 133 L.	.0075							
Oviat No. 1														
Oviat No. 2	70 V.		5662 V. 17 L.			5732 V. 17 L.	.057425							.0234375
Pierce No. 1			225 L.			225 L.	.01							
Pierce No. 2			5336 V.			5336 V.	.0223							
Lakeview Cutover, No. 1														
Lakeview Burn No. 1			5750 V. 125 L.			5750 V. 125 L.	.008							
Totals & Averages	2 V. 3 L	77 V. 22 L.	633 V. 102 L. 1 in.	3 V. 6 L.		714 V. 134 L. 1 in.	2.0101							.0234375

W217.

Spot burn, 35-40 years old, on southwest slope, Harvard-Deary road, Idaho. Timber stand outside of burn represents Dense Mature type, white pine, and contained no Ribes. Burn represents Open Reproduction type with many _R._ _viscosissimum_.

Lakeview Rockslide No. I.

This area is situated about midway between Lakeview Burn No. 2 and Lakeview Cutover No. 1. It was not located by legal subdivision.

The area consists of approximately ½ acre with soil too thin to hold the unstable rockslide beneath it. One cannot walk across it without slipping the underlying rock. It was carefully examined for Ribes. Neither R. viscosissimum nor R. lacustre were found to occur. Five G. inermis were encountered along the lower edge of this area, just above high water line.

IV. Summary

Some general deductions regarding the germination of R. viscosissimum, and to a lesser extent of R. lacustre, can be made from the data of Table II.

Although all Ribes are generally absent from mature virgin white pine stands, the removal of the duff ground cover either by fire or by mechanical means, brings about the immediate germination of Ribes in large numbers. This germination usually occurs the first year after the fire or logging operation, although in some cases, the Ribes germinate the same year as the fire. The second year following the fire or logging usually sees very little germination, and there is practically no later germination. R. viscosissimum appears to entirely follow this scheme of germination, with R. lacustre showing marked tendencies along the same line.

Fire appears more universally successful as an aid to Ribes germination than does the mechanical uncovering of the soil. Intensely burned areas, however, appear to be very effectively freed from Ribes germination. The table shows insufficient data to substantiate this, because the heavily burned areas were not sufficiently segregated in the 1926 field data to permit separate tabulation. Intense burns appear to have an equally prohibitive effect on the several species of native Ribes.

The tabular data on areas having the ground cover only burned off (crown canopy still overhead) indicate that light is a decided factor in the germination of Ribes, but that it is not of comparable importance with the duff factor.

All data collected indicate that on undisturbed slashings, that is where the duff mantle was not disturbed, there is no Ribes germination.

The tabulated data show some germination of Ribes on unburned timber areas, but upon closer study, practically every such Ribes found is within an inch or two of the edge of a burn, or within a foot or two of a fire trench, where the uncovering of the mineral soil and of the seed was so nearly complete that some germination became possible. More careful observations regarding these scattered germinations are necessary.

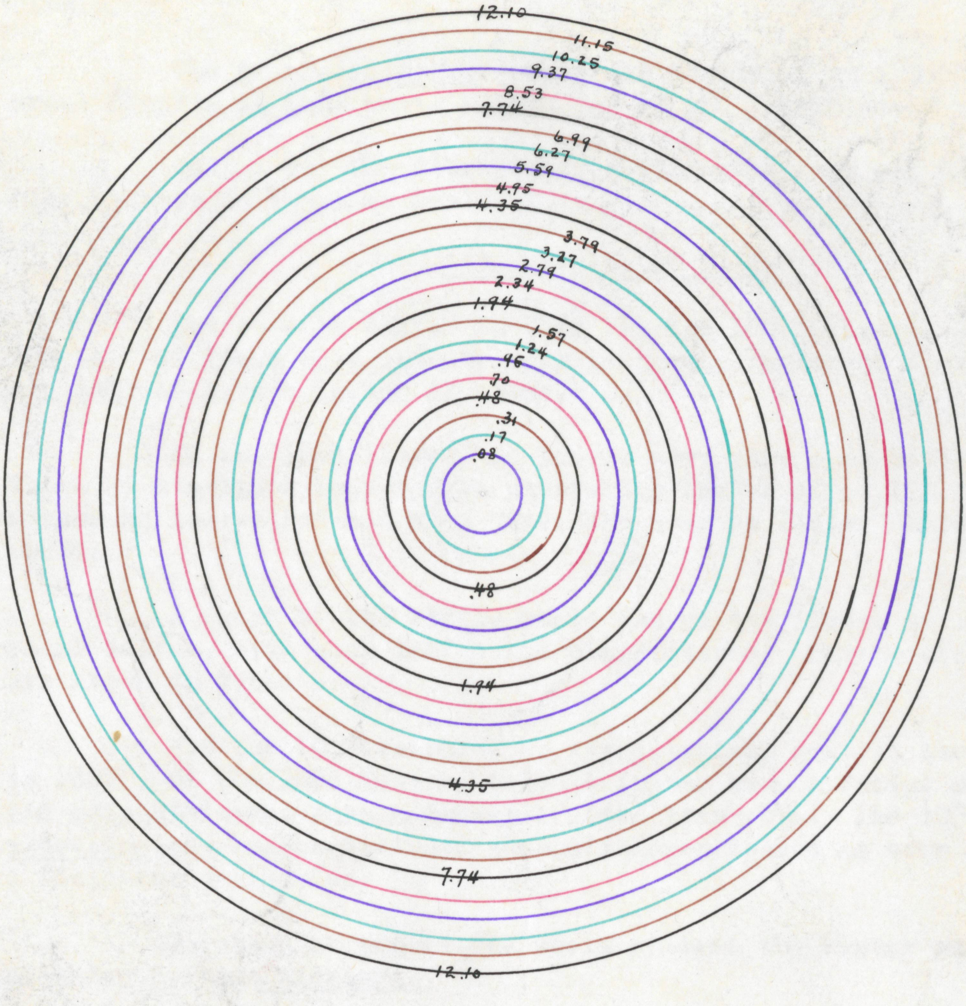
Leaf Area-Live Stem Ratio Study

I. Purpose of Study

The purpose of this study is to obtain definite information regarding the amount of leaf surface of Ribes bushes of various sizes and forms. The amount of leaf surface, and the height of the bush, are the factors which greatly influence the infecting power of a given Ribes bush.

II. Methods of Work Used

The first efforts along this line contemplated the use of the Caruthers linear scale for measuring areas of Ribes leaves. The scale was tried, however, and proved to have such errors in area that the writer began searching for another means of measuring said leaves. A circular concentric scale made of celluloid is the result of this search, the same foundational scale being usable for the leaves of Ribes of any species, the only difference being the set of areal figures for each species. The scale for R. lacustre is reproduced herewith.


12.10
11.15
10.25
9.37
8.53
7.74
6.99
6.27
5.59
4.95
4.35
3.79
3.27
2.79
2.34
1.94
1.57
1.24
.96
.70
.48
.31
.17
.08
.48
1.94
4.35
7.74
12.10

In developing this scale, 1000 leaves of R. lacustre from bushes of every size and form were each twice measured by planimeter. At the same time, the area of the circle which would entirely enclose the individual leaf was recorded. The average planimeter measurement of the 1000 leaves proved to be .616 of the average area of the circumscribed circle. Hence the R. lacustre scale has for its set of areal figures, areas which give in square inches, .616 of the area of each individual circle.

The R. viscosissimum scale was developed in a similar way, the areal figures on this scale being .697 of the circle area.

Scales for the other Ribes species have not yet been made, but will be made on the same basis.

III. Results of Study

The average factor is .616 for the 1000 measured R. lacustre leaves. Of these 1000 leaves, only 14 have a factor of over .700, and only 14 have a factor of under.520.

Of the 1000 leaves, 26 leaves were very much distorted in shape. These 26 misshapen leaves have an average factor of , .551. If these misshapen leaves had not been used, the average factor would have been .61763.

A check of the circle scale and of the linear scale was made on 31 leaves, with each leaf twice planimetered. The results of this test are shown in Table 3.

For the 1000 measured R. viscosissimum leaves, the average factor is .697. Of the 1000 leaves, only 14 leaves have a factor of over .796, and only 28 leaves have a factor of less than .596. The 1000 R. viscosissimum leaves included such misshapen leaves as were encountered in a field-run collection.

No check of the circle scale against the linear scale has been made for R. viscosissimum.

This scale can be used with nearly the same rate of speed as can the linear scale, and with much greater accuracy. It can be used to measure leaves in the field, and anyone can be taught to use it in a short time.

The collected leaves from measured R. lcaustre bushes, are being measured at the present time, but are as yet incomplete.

Leaves from many bushes of R. viscosissimum, R. petiolare, and G. inermis are also awaiting measurement, but there are no results to report.

IV. Summary

There are no final data yet available from this study.

Ribes lacustre Studies

I. Purpose of Study

The purpose of the study is to obtain intimate knowledge of the life and growth habits of R. lacustre.

II. Methods of Work Used

A square chain plot was established in 1924 on a 1920 burn having a heavy crop of R. lacustre seedlings since the fire. The plot is subdivided into 64 half-rod squares. The following data regarding each Ribes were taken, and a count of the coniferous growth by species in each square, was made.

III. Results of Study

Of the 79 R. lacustre within the plot in 1926, the years of germination are divided as follows:

1920 - 1
1921 - 24
1922 - 27
1923 - 9
1924 - 9
1925 - 3
1926 - 2
19[illegible] - 4
Doubtful age - 4

The data for the preceding years are not yet assembled, so no further report can be made.

IV. Summary

Germination was heaviest the two years following the fire, and has decreased steadily since that time.

Ribes viscosissimum Studies

I. Purpose of the Study

The purpose of this study is to obtain an intimate acquaintance with the life and growth habits of R. viscosissimum.

Table III.

Check on R. lacustre Circle Scale

Area in Square Inches					% Error from Average Planimeter Measurement.	
Circle Scale	Linear Scale	1st Planimeter Measure	2nd Planimeter Measure	Average Planimeter Measure	Circle Scale	Linear Scale
5.25	3.45	5.28	5.33	5.31	-1.11	-35.03
4.30	2.95	4.47	4.51	4.49	-4.23	-34.30
5.45	3.75	5.32	5.35	5.34	+2.06	-29.77
4.30	3.00	4.75	4.74	4.75	-9.47	-36.84
3.55	2.55	3.60	3.64	3.62	-1.93	-29.56
2.75	2.00	2.71	2.76	2.74	+0.37	-27.01
6.10	3.40	6.10	6.00	6.05	+0.83	-43.80
4.25	2.80	4.40	4.40	4.40	-3.41	-36.36
4.35	2.90	4.52	4.54	4.53	-3.97	-35.98
6.30	4.15	6.32	6.41	6.37	-1.10	-34.85
4.95	2.80	4.85	4.90	4.88	+1.43	-42.62
4.65	3.10	4.82	4.76	4.79	-2.92	-35.28
3.20	2.25	3.20	3.29	3.25	-1.54	-30.77
5.45	3.70	5.27	5.35	5.31	+2.57	-30.32
5.05	3.35	5.10	5.16	5.13	-1.58	-34.70
4.65	3.15	4.72	4.74	4.73	-1.72	-33.51
4.25	3.25	4.30	4.32	4.31	-1.41	-24.59
4.35	3.00	4.05	4.05	4.05	+6.90	-25.93
3.90	2.80	3.60	3.60	3.60	+7.69	-22.22
3.80	2.90	3.53	3.51	3.52	+7.37	-17.61
2.80	2.40	2.86	2.84	2.85	-1.78	-14.29
1.90	1.65	1.87	1.90	1.89	+0.53	-13.16
6.10	3.85	5.70	5.70	5.70	+7.01	-32.46
5.10	3.15	5.00	5.00	5.00	+ 2.00	-37.00
4.70	3.20	4.53	4.60	4.57	+2.85	-29.98
4.95	3.55	4.92	5.00	4.96	-0.02	-28.45
3.70	2.65	3.65	3.67	3.66	+1.09	-27.60
2.20	1.75	2.20	2.22	2.21	-0.05	-20.81
2.15	1.90	2.02	2.00	2.01	+6.96	- 5.47
1.15	1.00	1.16	1.17	1.17	-1.71	-14.53
0.40	0.45	0.40	0.40	0.40	0.00	+11.25
Totals and Averages						
126.30	86.80	125.22	125.88	125.55	+0.59	-30.87

II. Methods of Work Used

A series of square chain plots have been established at Elk River, Idaho and Sanders, Idaho where the rate and manner of growth of *R. viscosissimum* is under observation.

For each square chain plot, the following maps are made; (1) Contour map (2) Vegetative type map (3) Ribes location map (4) White Pine location map. In addition, the following data were taken regarding each individual Ribes.

Table No. IV

Ribes viscosissimum Growth Studies

Serial No. of Ribes	Height of Ribes in feet	Live Stem of Ribes in feet	Dead Stem of Ribes in feet	New Growth of Ribes in feet	Percent and kind of Shade	Hours of day in Sunlight	Percent of Diffuse light	Special Notes
1	1.0	1.0		0.1	100.0 Log	8:30-2:00	100.0	Under north edge of 30 inch down log.
2	2.2	4.2		0.7	95.0 Ceanothus	2:00-6:00	85.0	
3	2.4	4.0	7.2	1.0	50.0 Ceanothus	8;00-11:30 2:00-6:30	100.0	

III. Results of the Study

Some of the plots which are being studied were first established in 1922 and were rechecked in 1923 and again in 1926. Some very good growth studies are already obtainable from the data already gathered, but the tabulations are incomplete, so no report can yet be made.

Five such plots have been established, 4 at Elk River, Idaho, and 1 near Sanders, Idaho.

IV. Summary

Tabulation and analysis of these plots are incomplete, and no report can yet be made.

Grossularia inermis Studies

I. Purpose of Study

The purpose of the study is to obtain intimate knowledge of the life and growth habits and conditions of *G. inermis*.

II. Methods of Work Used

A square chain plot was established near Santa, Idaho, and permanently plotted and staked.

A contour map and a Ribes location map of the plot were very carefully made. The data taken for each Ribes bush, is shown in Table No. IV.

III. Results of Study

The tabulation and analysis of conditions on the plot are not yet available, since the field data has not been assembled.

IV. Summary

Since the data are not yet tabulated and analyzed, no summary can be made.

Age Studies of Ribes

No definite study of Ribes ages has yet been carried on. Only numerous observational notes at widely separated times and localities have been taken.

The youngest fruiting Ribes bush yet recorded by the Western Office is one which germinated in 1924 on an early 1924 burn (Meadow Creek Burn No. 1.) This bush in August 1926 had 38 feet of live stem, and there were 3 ripe fruits on the plant. This observation proves that fruiting can begin two years after germination.

Numerous bushes have been counted for age. The usual minimum fruiting age appears to be from 5 to 7 years.

From counts of ages of several hundred bushes in the past four seasons, very few Ribes in the white pine region of the Inland Empire show more than 15 years of actual live stem. These same older bushes, however, usually have a large amount of dead stem, indicating that the actual age is probably many years more than is actually counted either by the annual rings or by the annual linear growth.

The usual one-year old Ribes seedling is a very small plant, probably averaging less than 2 inches in height, yet individual plants do make some very rapid growths. For instance, on Lakeview Burn No. 1, one R. viscosissimum seedling of 1926 germination was found on September 14th, 1926, having a height of 2.2 feet, with 3.2 feet of live stem.

One area having a large number of R. viscosissimum bushes, which are fruiting heavily is between Oviat Burn No. 1 and Oviat Burn No. 2 along a series of railroad cuts and fills. Age count, by linear stem growth only, was made of 55 of these bushes. Germination in 1919 was indicated by 12 of these, 1920 by 20, and 1921 germination by 23. Many were so indeterminate as to age that it is quite possible all of these bushes are of 1919 germination.

A logger of this vicinity stated that these railroad cuts and grades were made in June,1918, which would indicate germination in 1919.

CONTROL RECONNAISSANCE ON FEDERAL LANDS, IDAHO.

by
H. N. Putnam,
Assistant Pathologist.

* *

I. Purpose.

The purpose of control reconnaissance as performed this past season was to make a rapid and systematic survey of the white pine regions to determine: (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

Information desired on areas worked may be grouped into 5 major subdivisions as follows:

1. Timber types.
2. Timber age classes.
3. Eradication types.
4. Ribes per acre by species within each eradication type.
5. Physical factors.

It was also a secondary purpose of control reconnaissance to furnish projects such as experimental Ribes eradication, ecology and chemical eradication the information as to the location of areas peculiarly adapted to the needs of such projects.

II. Methods of Work.

Control reconnaissance as performed this past field season was so radically different from that of preceeding years that a word of explanation is necessary.

In 1923 and 1924 reconnaissance was performed on a drainage basis using the strip method. The section as a unit was not considered. Two or three men made up a crew.

In 1925 reconnaissance data were taken on the basis of 4 strips through a section. Two men made up a crew.

In 1926, in order to overcome several weaknesses, the methods of performing the work were radically changed. The bad features of reconnaissance performed previously to 1926 were as follows:

1. Insufficient acreage covered. There are approximately 3,721,125 acres gross in the 5 Idaho National Forests lying in the region of white pine production, approximately 1,550,000 acres of which are white pine type. Previous to the 1926 field season we had reconnaissanced 199,811 acres, not necessarily all white pine type. This constituted less than 6% of the gross acreage.

2. Too large a cost per acre. Reconnaissance performed previous to 1926 had cost from 11 cents to 13 cents per acre for intensive work.

3. It was a long difficult matter to put data collected into usable form.

Reconnaissance in 1926 was organized with the purpose of correcting these defects. By means of extensive typing, and the use of one man crews on intensive work a much larger area was covered with a consequent reduction in cost per acre. Data were taken in the field by means of 1/10 acre plots and put into final summary form on sectional basis in the field. This did away with the necessity for long, tedious office calculations in the winter. It was also more accurate, since special conditions could be set down while they were still fresh in the field man's mind.

It is well at this time to call attention to the relationship between intensive reconnaissance and extensive reconnaissance, or typing. It is the function of the latter phase of work to furnish the application to which the intensive data on sections judiciously chosen would apply. As the data taken on plots in each type were taken as defining conditions on the section, so were the sections chosen considered as typical of the extension of such types studied.

Instructions to Field Men.

The methods of performing control reconnaissance used by men working on Federal lands and timber protective associations can best be explained by "Instructions for Performing Control Reconnaissance", a copy of which was given to each man at the beginning of the training period. The paper follows quoted in full:

"I. Purpose:

The purpose of control reconnaissance is to make a rapid and systematic survey of the white pine region to determine: (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

"II. Methods:

In brief, the method of performing control reconnaissance is as follows: each man works a section alone, under the supervision of the Chief

of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of representative sample plots.

"The actual details of work may be considered in 3 steps: (1) the division of a section into eradication types, timber types and timber age classes; (2)obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form.

"A. Typing: the section and such areas adjacent thereto as can be readily seen will be covered in such manner that all types will be seen, sketched in, and properly designated as to eradication type, timber type and timber age class. This may be done by any one of the following methods or similar methods, as is best adapted to local topography.

"The mapper may cover the section by starting at a quarter corner, running a line to each of the other three quarter corners and closing on his starting point.

"He may run through the center of two quarters, offset a half mile on the section line, and return through the center of the two remaining quarters.

"He may start at a section corner, run diagonally across a corner forty, then traverse the section on forty lines.

"He may start at a known point on the section and run a random line on the section, plotting his course as he goes.

"The essentials for the mapper to bear in mind are: (1) always to keep himself oriented, and (2) to be sure that all types have been covered. Whatever method he uses, the mapper should tie in to some land office corner. Distances will be measured by pacing and directions taken by box compass.

"Designation of types: the standard classification of forest types as used by the Forest Service will be used. A copy of definitions of these types accompanies these instructions.

"The age class of a timber stand will be that age class which will next be logged. The following timber age classes will be recognized:

1 - 10 years
11 - 20 years
21 - 40 years
41 - 60 years
61 - 80 years
81 - 100 years
101 - 200 years
200 + years

"An eradication type is an area on which eradication working conditions are similar. There will be eight eradication types defined as follows:

"1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes.

"2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

"3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

"4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

"5. Dense reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present, depending on the size of the reproduction.

"6. Open reproduction, (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes.

"7. Stream type (St.) an area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

"8. Brush (Br.) an area either cut or burned over on which reproduction has not yet occurred.

"B. Recording data: information on each type will be obtained by means of one man sample plots distributed over the type in such manner as will give representative conditions. To avoid the influence of personal selection, such plots will be located at arbitrary distances over some course that will cover the type. At least 1/2 of 1 percent of each type other than stream type should be covered by circular sample plots. On stream types at least 2 percent of the area should be covered, since the stream type is the most important, because of the large number of Ribes and conditions favorable to the development of the blister rust.

"On types other than stream type, data will be taken on circular plots having an area of 1/10 acres and a radius of 37 feet. On stream types data will be taken on plots 4 chains long and 1 rod wide, having an area of 1/10 acres.

"The location of each sample plot should be indicated on the map corresponding to its number.

"A detailed explanation of the forms for recording data is omitted here, because the forms are self explanatory.

"C. Compilation of data: upon arrival in camp in the evening all type lines must be jibed with maps previously typed.

"On rainy days and at odd times data must be completely worked up on the section summary sheet, so that at the end of each month the entire work done to date is in final form and in the Field Supervisor's hands. It is part of the Chief of Party's responsibility to see that this is done."

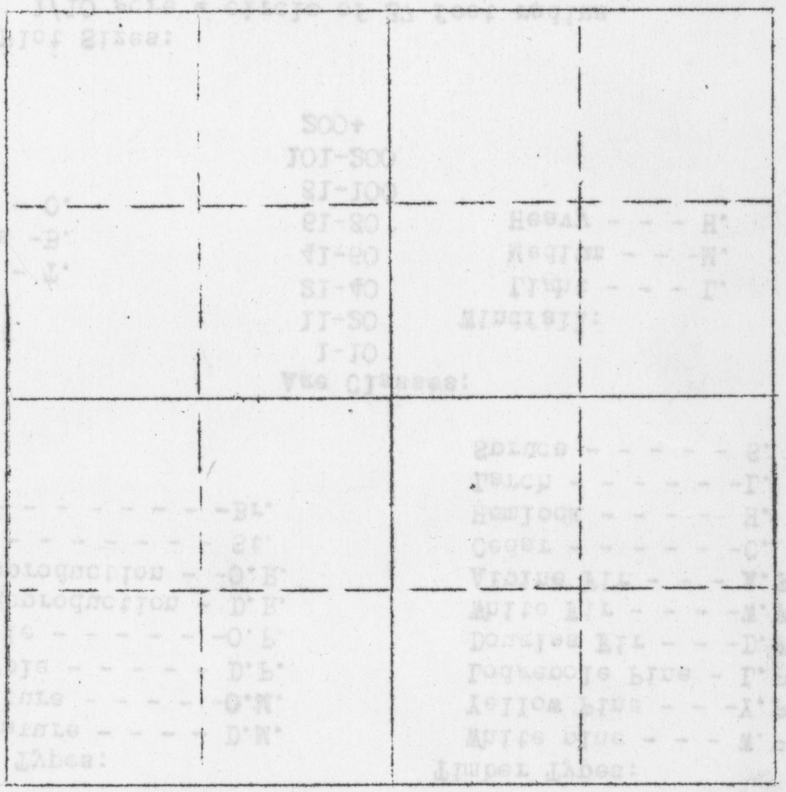
The following forms were used in the field, in recording reconnaissance data:

WF-25-BRC-6-12-26

Sec._____ T._____ R._____ Locality____________________

Mapped by____________________ Date__________ 1926

Notes by____________________ Date__________ 1926



Scale 4 in. = 1 mile

(Legend on reverse side)

LEGEND

Eradication Types:

- Dense Mature - - - - D.M.
- Open Mature - - - - -O.M.
- Dense Pole - - - - - D.P.
- Open Pole - - - - - -O.P.
- Dense Reproduction - D.R.
- Open Reproduction - -O.R.
- Stream - - - - - - - St.
- Brush - - - - - - - -Br.

Timber Types:

- White pine - - - W.P.
- Yellow Pine - - -Y.P.
- Lodgepole Pine - L.P.
- Douglas Fir - - -D.F.
- White Fir - - - -W.F.
- Alpine Fir - - - A.F.
- Cedar - - - - - -C.
- Hemlock - - - -- H.
- Larch - - - - - -L.
- Spruce - - - - - S.

Rock:

- Talus - - T.
- Boulders -B.
- Outcrop - O.

Age Classes:

- 1-10
- 11-20
- 21-40
- 41-60
- 61-80
- 81-100
- 101-200
- 200+

Windfall:

- Light - - - L.
- Medium - - -M.
- Heavy - - - H.

Plot Sizes:

1/10 acre = circle of 37 foot radius
1/20 acre = rectangle 2 chains by 1 rod

Type line = ...
Stream =

WF-24-BRC-6-12-26

Sec. T. R. Locality

Erad. Type Timber Type Age Class Acres

Plot		0-1		1-6		6-12		Over 12		Composition	
No.	Size	W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other	Over story	Under story
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Plot		Ribes Species									Brush Density Tenths	Wind fall H.M.L.	Rock T.B. O.
No.	Size	1	3	3+	1	3	3+	1	3	3+			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Remarks:- Exposure, brush genera, date of cutting or burn, condition of timber and Ribes, etc.

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WF-24-BRC-6-12-26

Sec. T. R. Locality

Erad. Type Timber Type Age Class Acres

Plot		0-1		1-6		6-12		Over 12		Composition	
										Over	Under
No.	Size	W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other	story	story
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Plot		Ribes Species									Brush	Wind	Rock
No.	Size										Density	fall	T.B.
		1	3	3+	1	3	3+	1	3	3+	Tenths	H.M.L.	O.
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Remarks:- Exposure, brush genera, date of cutting or burn, condition of timber and Ribes, etc.

SECTION SUMMARY

S. T. R. Locality Mapped by Date Notes by Date

Erad. Type	Timber		Plot Acres	Type Acres	Trees per Acre								Stand Composition			Dens %
	Type	Age Class			0-1		1-6		6-12		Over 12		Overstory	Understory	Genera	
					W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other				

Remarks:-

S E C T I O N   S U M M A R Y

S.   T.   R.   Locality

Windfall	Rock		Ribes per Acre												Total Ribes			
	Class	Abundance	1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total

Modification of Methods

Certain modifications of the methods adopted at the beginning of the season as applied to work on Federal lands can best be explained by a memorandum issued on July 4, 1926. This is given below, quoted in full.

"Considered in 4 portions:
I. Extensive typing.
II. Picking representative sections.
III. Working selected sections by sample plot method.
IV. Working up results.

I. Extensive Typing:

"On a two inch to mile township map are drawn all streams, roads, trails and peaks. This is taken from the G. S. map. The man typing has with him a G. S. map with all available typing thereon, and one or more township plats.

"He traverses the ridges, mapping in timber types, age classes, and eradication types at every opportunity. By going around a drainage he can get this information with a fair degree of accuracy. If it is not possible for him to determine at a distance the age class, timber type, or eradication type, he puts in his best estimate. He checks his location by pacing from a known point, and by local topography. This kind of work calls for considerable good judgment, and an accurate sense of proportion. There is a tendency to make too many types. Often a type which appears from one angle to be dense mature, proves from a different view point to be a younger age class with a scattered overstory. This is particularly true in the Prichard area, where there are thousands of acres of 1889 burn coming up densely to excellent white pine- white fir - hemlock reproduction 35 years old. Over certain portions of this area are scattered larch, white pine mature. This often gives the effect of a mature stand when seen from certain angles.

II. Picking Representative Sections:

"When a large drainage, 15 or 20 sections, has been typed extensively it is the duty of the chief of party to study this map and pick out certain sections for plot work. The essentials for him to bear in mind are that the sections chosen shall be white pine, and that all different age classes and eradication types in the white pine type in that drainage will be covered by sample plots.

III. Working Selected Sections by the Sample Plot Method:

"Before going into the field the man designated to work a given section or sections draws in all type lines on his 4 inch to mile map

from the extensive type map. He then figures the acreage in each white pine type and finds out how many plots it will be necessary to take in order to make up .5% of types other than stream type, and 2% of stream type. He then plots these sample plots on his map sheet, usually at a stated distance apart and in a straight line, being careful that all sample plots come well inside the type studied.

"Two deviations from the standard method of putting in plots I believe will prove better.

"Timber is taken on a circular 1/10 acre plot as before. Reproduction is counted on a circular 1/40 acre plot having a radius of 18 feet. This is multiplied by 4 and set down as the number on a circular 1/10 acre plot.

"Considerable difficulty and diversity of opinion developed in taking a Ribes count on a circular 1/10 acre. Owing to the size of the plot, 37 feet radius, it was nearly impossible to get an accurate count of Ribes, particularly in dense reproduction. Either many Ribes were missed, or else some counted twice. To overcome this difficulty, and to be free to concentrate on Ribes, the latter are now being counted on a plot 4 chains long and 1 rod wide, similarly to stream type.

"The essential thing we are after is the Ribes per acre; and heretofore the man's attention has always been divided between timber and Ribes. By the method of taking timber data on a circular 1/10 acre at the beginning of a 4-chain 1/10 acre plot, and then concentrating on Ribes, it is believed that a much more accurate figure will be obtained on the number of Ribes per acre. There will be no appreciable loss in timber data accuracy. To be sure, the timber data is not taken on the whole of the Ribes strip, but is it, after all important? Since we are studying conditions by types, I believe we have not lost anything. Furthermore since it is not necessary to take timber data on areas on which there are already timber data available, let us be consistent and not necessarily confine our taking timber data strictly to Ribes strips. I believe that whatever we lose in strict timber accuracy will be more than compensated by increased Ribes count efficiency. After all, our timber data are only "conscientious approximations".

"The man doing sample plot work also is free to check up on type limits as given him from the extensive type map.

IV. Working up Results:

"Each night the sample plot man works up his data on the final section basis, and makes his additional notes while everything is fresh in his mind.

Additional Notes

"After a thorough tryout of this method in the field, I have come to the conclusion that control reconnaissance, as performed this year will be the best we have performed yet from the standpoints of (1) covering many acres well, and (2) training men.

"1. <u>Covering the ground.</u> This method should enable us to get the dope on at least 250 or 300 sections at a low cost per acre.

"2. <u>Training men.</u> Data on types are taken by means of 1/10 acre plots. Each night, or when the section is finished, data are worked up on acreage basis, while conditions are fresh in mind. At the end of the season, a good reconnaissance man should be able to go over a piece of ground and estimate quite accurately the number of trees and Ribes per acre on that area, at least in number classes: below 10, 10-50, 50-100, 100-200, etc. In other words, this training is excellent for future advance scouts. It develops a man's "acreage perception", so to speak.

"Also in typing extensively a man develops himself very much to the advantage of the office.

"At the end of the season on all areas worked, I plan to have township maps 2" to mile on which are shown the following items: timber type, age class, eradication type, Ribes per acre. The notes will show where such Ribes occur by species and number."

III. Results of Control Reconnaissance

The work performed on Federal lands can well be discussed under five headings as follows:

A. Training of personnel.
B. Coeur d'Alene National Forest.
C. Palouse Division, St. Joe National Forest.
D. Coeur d'Alene National Forest and St. Joe National Forest combined.
E. Preliminary trip on St. Joe National Forest.

A. Training of Personnel:

The temporary men employed for this work were given a 4½ day training in reconnaissance methods on a portion of the area to be worked near Prichard, Idaho, from June 22 to June 26. During this period, one day was spent in camp going over the written instructions. Three days were spent by the entire crew in methods of typing and plot work, during the course of which instruction was given in the identification of Ribes and other shrubs. One-half day was devoted to training in methods of

summarizing data on the final sectional basis.

During the course of the summer, every man who stayed on through the season visited the eradication camps for the purpose of:

(1) Getting the eradication man's view point on the interpretation of eradication types, and
(2) Familiarizing himself with the eradication methods.

Costs of Training: Table No. 1 shows the items making up the costs of training the personnel.

Table No. 1

Training Costs

Salaries	Travel			Subsistence			Equipment		Grand Total
	Auto	Other	Meals	Meals	Rate per Meal	Cost	Charge	Frt.	
223.90	27.93	11.00	12.85	98 52 Meals paid for as received	.283 0	27.71 0 3.00			
Totals 223.90	27.93	11.00	12.85			30.71			306.39

A total of 58 1/2 days were spent in training, divided as follows:

Training reconnaissance	32 1/2
Training eradication	13 1/2
Travel incident to training	12 1/2

$$\frac{\text{Total Cost}}{\text{No. of Men}} \quad \frac{\$306.39}{7} = \$43.77 \text{ Training cost per man}$$

$$\frac{\text{Total Training Cost}}{\text{Man Days}} \quad \frac{\$306.39}{58.5} = \$\ 5.24 \text{ Cost of training per man day}$$

B. Coeur d'Alene National Forest

(1) Geographical Description

Control reconnaissance in 1926 was performed in the eastern portion of the Coeur d'Alene Forest, on the area comprising nearly all of the Prichard and Carter Ranger districts. It included the entire drainages and tributaries of Big Creek, Lost Creek, Prichard Creek, Beaver Creek, Cedar Creek, Grizzly Creek, Graham Creek, Steamboat Creek and that portion of the North Fork of Coeur d'Alene River and its tributaries not previously mentioned, from the mouth of Big Creek to the mouth of Steamboat Creek.

Topography is rugged, consisting of comparatively low, steep-sided hills. Elevations range from 2250 feet above sea level at the mouth of Steamboat Creek to 6810 feet at the top of Granite Peak, and points above 6000 feet on the Idaho-Montana state line. The streams are swift flowing, with narrow, steep sided valleys, for the most part. The lower portions of Eagle Creek, Prichard Creek and Beaver Creek have the widest valleys varying in width from one-eighth to one-quarter miles, but never exceeding one-half mile.

(2) Economic Development

The chief industries in the region are mining, lumbering, and general farming. This was once a region of great mining activity. Mines are still in operation on Beaver Creek, East and West Forks of Eagle Creek and at several points on Prichard Creek. Prichard Creek has been extensively dredged for gold, the operation being completed in June 1926.

Lumbering operations are principally carried on by two concerns, the Winton Lumber Company operating on Falls and Big Creeks, and the Mountain Lumber Company operating on the East Fork of Eagle Creek. The Winton Lumber Company, cutting Forest Service and privately owned lumber on Falls Creek, send their logs by means of greased chutes and water flumes to Big Creek, thence drive them by a series of splash dams, to a log pond near the mouth of Big Creek, where they are loaded on freight cars and shipped out. The Mountain Lumber Company, cutting on Forest Service timber entirely, take their logs by rail to their small mill on Eagle Creek, six miles from their cutting operation.

In the past there have been extensive cutting operations on Big Creek, Cedar Creek, Graham Creek and Steamboat Creek.

General farming is limited to a few small ranchers on the North Fork of the Coeur d' Alene River, and on Beaver Creek.

There are two towns in this region, Prichard and Murray. They were once thriving mining centers of several thousand population each, but now are reduced to one or two hundred inhabitants each. Both Prichard and Murray have good general stores from which food supplies may be obtained.

There are two District Ranger headquarters, Carter and Prichard. Through the cooperation of the Forest Service, facilities are available for storing supplies and for camping at each of these offices. Temporary summer Forest Service field stations are located for fire protection purposes at Grizzly Peak, Little Baldy Lookout, at the junction of Falls and Big Creeks and at Clinton Creek.

(3) Accessibility

This area is well opened up by railroads, roads and trails. There is one train every week day coming into Prichard from Spokane. The Winton Lumber Company has a logging railroad from Prichard up the North Fork of Coeur d'Alene River, ten miles to Big Creek, on which there is a daily, except Sunday, logging train connecting with the main line at Prichard. There is also a logging railroad extending north from Prichard twelve miles up East Eagle Creek built by the Mountain Lumber Company.

There are seventy-five or eighty miles of good passable auto roads in the region, confined to the Beaver Creek, Prichard Creek and Eagle Creek drainages, and to the North Fork of the Coeur d' Alene River from Prichard down the river. The region is accessible from points outside by means of a good auto road north from Wallace, Idaho to Prichard along Beaver Creek and a passable road east from Enaville, Idaho up the North Fork of the Coeur d'Alene River to Prichard. A resurvey of this roadway was made in the summer of 1926.

The country not covered by roads is well opened up by Forest Service trails and old logging ways, thus making any portion of the area accessible.

Owing to the distribution of ranches, logging camps, Forest Service stations and mining camps facilities for boarding are excellent. Camping sites are numerous at abandoned logging camps and mining camps throughout the area.

(4) Forest Types Found

Excellent white pine stands occur throughout the region. The white pine types do not form continuous stands, but are generally confined to the north and east facing slopes and cool, narrow draws. The north and south exposures seem to exert much more of an influence on type composition than do the east and west exposures. That is, a slope essentially facing west, but also slightly north supports a white pine type, whereas a slope facing east and south is covered by a non white pine type. On nearly half of the entire area reconnaissanced white pine type occurs. The white pine is found in mixture with larch, lodgepole pine, white fir, alpine fir, Douglas fir and cedar as well as western hemlock. The last named species is not as common here as it is in the western part of the forest and further north. White pine extends up to 5000 feet elevation in commercial stands.

In this region there are extensive stands of larch, Douglas fir and white fir, occupying south and west exposures. On the hottest, dryest slopes scattered Douglas fir is found growing among rocks and in shallow soil.

Considerable sub-alpine type occurs. This consists often of nearly pure stands of mountain hemlock (Tsuga mertensiana) or stands consisting of black hemlock and alpine fir. This type occurs in a band from 5000 to 6000 feet above sea level. Above 6000 feet white bark pine (Pinus albicaulis) is found. On the top of Granite Peak (elevation 6810 feet) a pure stand of white bark pine occurs.

(5) Age Classes Represented

All of the age classes of white pine type occur in this region. There is a large acreage of age classes up to 41 to 60. In 1889 when mining activities first began, the miners burned over large areas in Beaver and Prichard Creeks to expose the surface of the soil. On the north facing slopes of such areas there are now excellent stands of fully stocked white pine, about 35 years old. Large areas burned over in 1910 in the Lost Creek drainage are now coming back well to white pine about 15 years old. Several cut over areas have good white pine reproduction one to ten years of age.

There are quite extensive areas of 81 to 100 and 101 to 200 year white pine on Steamboat and Big Creeks. The 200 plus year white pine occurs on Big Creek and on the upper portions of Prichard Creek.

In this area there is a relatively small amount of the 41 to 60 and 61 to 80 year age classes.

(6) Ribes Conditions

Ribes are abundant and well distributed in this region. Only a relatively small per cent of the area reconnaissanced was found to be Ribes free.

Five species of Ribes found listed in order of decreasing abundance. R. lacustre, R. viscosissimum, Grossularia inermis, G. irrigua, and R. coloradense.

R. lacustre has the widest distribution of any Ribes found. It occurs in every eradication type, being especially profuse along streams and in brush types.

R. viscosissimum owing to its intolerance of shade and its relatively low water requirements is most abundant in brush and open types. It occurs much less frequently along streams and in dense stands of timber.

G. inermis is quite strictly an inhabitant of the meadow formation. It is almost entirely limited to deep, moist soils, growing intermingled with maple, alder and willow. It is found in abundance on Beaver Creek, Eagle Creek and Prichard Creek.

G. irrigua in this region reaches its greatest abundance at the edges of talus slopes, where often it forms the chief brush, growing in sprawled masses. Large amounts of this species were found on talus slopes of Eagle Creek, Big Creek, Cedar Creek and the North Fork of the Coeur d'Alene River. Owing to the fact that the field men experienced difficulty in distinguishing G. inermis from G. irrigua, these two species were considered together.

R. coloradense was found only at one location, near the outlet of Revett Lake, at an elevation of 6300 feet. Here it occurred in dense, low masses among the rocks at the edge of the fast flowing stream. Since evidently it is a species confined to subalpine types, it is not a factor in the protection of commercial white pine from blister rust.

R. coloradense has not previously been known to occur in the Idaho white pine region. The Ribes species found at Revett Lake is tentatively named R. coloradense because its characteristics other than flower and fruit fit the description of R. coloradense. Definite determination of the species will be made in the spring when it is in flower.

(7) Results Obtained.

Table No. 2 shows the land description and number of acres on which control reconnaissance, both intensive and extensive were performed in 1926

Table No. 2.

Location and Number of Acres Reconnaissanced,

Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926.

Sections Worked in Whole or in Part									
		Intensive Reconnaissance			Extensive Reconnaissance			Grand Total	
			Total			Total			
Twp	Range	Sections by Number	Sec.	Acres	Sections by Number	Sec.	Acres	Sec.	Acres
48N	4 E				1,2,3,	3	1920	3	1920
49N	3 E	1,2,9,11	4	2560	3,4,5,8,10,12,13, 14,15,16,17,24,	12	7680	16	10240
49N	4 E	1,2,5,6,9,10,11,16 18,19,22,23,25,27, 29,34,35,36	18	11520	3,4,7,8,12,13,14, 15,17,20,21,24,26, 28,30,33	16	10240	34	21760
49N	5 E	6,7,8,9,13,14,15, 16,17,19,22,24,27, 28.	14	8960	1,2,3,4,5,10,11,12 18,20,21,23,25,26, 29,30,31,32,33,34, 35,36	22	14080	36	23040
49N	6 E	18,19,20	3	1700	4,5,6,7,8,9,16,17, 29,30,31	11	5122	14	6822
50N	2 E				1,2,3,4,5,6,9,10, 11,12,13,14,15,16, 21,22,23,24	18	11520	18	11520
50N	3 E	2,11,25,26,35,36	6	3840	1,3,4,5,6,7,8,9,10 12,13,14,15,16,17, 18,19,20,21,22,23, 24,27,28,29,30,31, 32,33,34	30	19200	36	23040
50N	4 E	3,4,8,17,20,21,22, 23,24,25,26,27,28, 29,30,31,34,35,36	19	12160	1,2,5,6,7,9,10,11, 12,13,14,15,16,18, 19,32,33	17	10880	36	23040
50N	5 E	2,3,4,5,7,12,13,14, 16,31,32	11	7040	1,6,8,9,10,11,15, 17,18,19,20,21,22, 23,24,25,26,27,28, 29,30,33,34,35,36.	25	16000	36	23040
50N	6 E	19	1	620	6,7,8,17,18,20,30, 31,32,33	10	3335	11	3955
51N	1 E	24	1	640	25,26,35,36	4	2560	5	3200
51N	2 E	16,19,22,30,31,34	6	3840	9,10,11,13,14,15, 17,18,20,21,23,24, 25,26,27,28,29,32, 33,35,36	21	11555	27	15395
51N	4 E	3,4,10,15,17,21,32	7	4480	1,2,5,6,7,8,9,11, 12,13,14,16,18,19, 20,22,23,24,25,26, 27,28,29,30,31,33, 34,35,36.	29	18560	36	23040
51N	5 E	6,8,33,34	4	2310	5,7,17,18,19,20, 21,22,23,26,27,28, 29,30,31,32,35	17	8934	21	11244
52N	3 E				Entire Township	36	23040	36	23040
52N	4 E	17,22,29,33,34	5	3200	3,4,5,6,7,8,9,10, 14,15,16,18,19,20, 21,23,24,25,26,27, 28,30,31,32,35,36	26	15240	31	18440
52N	5 E	19,30,31,32	4	1780	29	1	160	5	1940
53N	3 E				25,26,32,33,34,35, 36	7	4480	7	4480
53N	4 E				19,29,30,31,32,33	6	2590	6	2590
T_O_T_A_L_S			103	64650		311	187096	414	251746

Table No. 3 gives the division of the total acreage reconnaissanced into white pine type and non white pine type, and the further division into age classes and eradication types.

Table No. 3

Total Acres Reconnaissanced by Age Classes and Eradication Types, Coeur d'Alene Nat. Forest, 1926

White Pine Type (Age Classes)												Non White Pine Types (Age Classes)									
Erad. Type	1-10	11-20	21-40	41-60	61 80	81 100	101 200	201+	not Classed	Totals Acres	Totals %	1-10	11-20	21-40	41-60	61 80	81 100	101 200	200+	not Classed	Totals
D.M.						3407	9590	5435		18432	15						235	3041	42		3318
O.M.						2304	45275	2745		50324	41							53612	94		53706
D.P.				980	115					1095	1				560						560
O.P.				709	115	145				969	1			230	265		285				780
D.R.	593	518	6912	35						8058	6	778	210	3422							4410
O.R.	19221	13029	7319							39569	32	20	13281	17685	45						21031
Str.									4595	4595	4									1007	1007
Rock																				270	270
Brush																				36214	36214
Sub-Alpin																				6995	6995
Clearing																				413	413
Total	19814	13547	14231	1724	230	5856	54865	8180	4595	123042	100	798	3491	21337	870		520	56653	136	44899	128704

Table No. 4

Acres Reconnaissanced by Eradication Types and Number _Ribes lacustre_ per Acre Classes

Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926.

	Number of Ribes lacustre per Acre Classes																						
Erad. Type	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	1501 2000	Totals
D. M.	1444	1050	140	405		300		1090	225		524													5178
O. M.	3717	2345	1785	1080	485	310	630	350	290	110		320	795	390	80			60	270	10				13027
D. P.	325	50	495																					870
O. P.	200	70					60																	330
D. R.	1390	570	355	210	1010	135	510	150	280	240	440	400		20		140								5850
O. R.	1385	2375	1575	615				280	400	155	200		35	55		80						25		7180
Str.	190		50	30	200	205		50		65	150	35	245	161	45	317	179	194	46	41	8	10		2221
Brush	390	520		15																280				1205
Rock					15	30																	1/4	45 1/4
Total	9041	6980	4400	2355	1710	980	1200	1920	1195	570	1314	755	1075	626	125	537	179	254	316	331	8	35	1/4	35906 1/4

Table No. 5

Acres Reconnaissanced by Eradication Types and Number of Ribes viscosissimum per Acre Classes
Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926

Erad. Type	Number of Ribes viscosissimum per Acre Classes																					
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	Total
D. M.	3573	915	690																			5178
O. M.	6532	2980	350	700	760	485	385			130		205				360	60		80			13027
D. P.	455	165	250																			870
O. P.	260	70																				330
D. R.	2320	2040	955	180	105	140			20			90										5850
O. R.	1425	1120	400	1575	390	690		555	220			350	120	335								7180
Str.	1672	332	85	55	6	50	20										1					2221
Brush	290	520	65	140							175		15									1205
Rock	45¼																					45¼
Total	16572¼	8142	2795	2650	1261	1365	405	555	240	130	175	645	135	335		360	61		80			35906¼

An examination of Table No. 4 shows that *R. lacustre* has a wide distribution. It is present in every eradication type, varying widely in number per acre from) to an average of 1750 per acre.

Referring to Table No. 5 it is evident that *R. viscosissimum* has a more restricted range than *R. lacustre*. With the exception of the open pole type on which there is insufficient information the open eradication types show a greater distribution of *R. viscosissimum* than do the dense eradication types. Due to its inability to withstand dense shade, *R. viscosissimum* is the first Ribes in this locality to be shaded out.

An examination of Table No. 6 shows that *G. inermis* and *G. irrigua* are practically restricted in their distribution to rock and stream types. In these situations, when they occur, they are often in great profusion, on areas limited in size, near water, making conditions favorable to their eradication by chemical means.

Table No. 6

Acres Reconnaissanced by Eradication Types and Number of G. inermis and G. irrigua per Acre Classes. Prichard and Carter Ranger Districts, Coeur d'Alene National Forests, 1926

	Number of G. inermis and G. irrigua per Acre Classes																				
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D.M.	5178																				5178
O.M.	12837	110	80																		13027
D.P.	870																				870
O.P.	330																				330
D.R.	5500	350																			5850
O.R.	6310	600	270																		7180
Str.	1319	255	80	10	250	92								65					150		2221
Brush	1205																				1205
Rock	½				15															30	45½
Total	33549½	1315	430	10	265	92								65					150	30	35906½

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